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Leveraging Expert Knowledge in Conditions of an Organizational Change

Helsinki Metropolia University of Applied Sciences
Master's Degree
Industrial Management
Master's Thesis
6 May 2012

PREFACE

This Thesis is the end result of a long learning process for me as I started with little or no experience of the issues tackled in the course of this study. Fortunately, the case organization where I work, the Finnish Transport Safety Agency (Trafi), provided me with an actual research problem, for if the study is to be successful, the solutions need to be valuable for the organization. After conducting this study, I consider myself if not an expert in the field studied then at least a person having learned a lot about the subjects covered. It also seems that the organization has already taken some new steps in the directions pointed in this Thesis, perhaps partially influenced by the work I have conducted.

The organization has given me the needed time and freedom to complete this study and I wish to thank all the people involved in this project for making this possible. Special thanks go to all of the experts at the Transport Technology department who sacrificed their valuable time for the interviews in the data collection phase, without which this study could not have been completed.

I would also like to warmly thank my instructors; Marjatta, Thomas and Zinaida as well as other teachers and student colleagues at Metropolia for their invaluable help and comments during the course of this study.

I'm grateful to my wife Alexandra for her support during the times of working and finalizing my studies, sometimes at the cost of the time spent with my family. This Thesis was conducted not only for professional or academic reasons, but also to fulfill a promise to my mother and late father to complete my Master's studies. I hope this effort sets an example for the next generation, too. I dedicate this work to my lovely daughter Wilhelmina and thank her for relieving my stress with her smile and laughter.

Helsinki, 6 May 2012
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Metropolia

Abstract

Researcher	Ville Räisänen
Title	Leveraging Expert Knowledge in Conditions of an Organizational Change
Number of Pages	66 pages + 7 appendices
Date	6 May 2012
Degree	Master's degree
Degree Programme	Degree programme in Industrial Management
Instructors	Marjatta Huhta, DSc (Tech) Thomas Rohweder, DSc (Econ)

This study is conducted to further develop the practices of sharing and leveraging expertise and knowledge in an expert organization. The case organization, the Finnish Transport Safety Agency (Trafi), has gone through several major organizational changes in the near past and these changes have been such that they could possibly have an effect on the expertise and knowledge utilization in the organization.

The study utilizes a single case study approach, concentrating on the case organization and collecting the data from one single department of the organization. This approach, with its limitations taken into account, provides a view into the organization's core as a governmental expert organization.

Qualitative data was obtained from the following sources: first, by conducting a knowledge utilization audit at the Transport Technology department of Trafi; second, by carrying out case company interviews with the experts; and third, by studying the case company organizational data. The knowledge utilization audit included questions related to the most recent organizational change and investigated the expertise and knowledge areas of experts, as well as gathered their views on the proposed practices for sharing expertise. The data were then analyzed and the proposals developed for intra-organizational practices of sharing expertise and knowledge.

The study revealed that there is a need to utilize the expertise possessed by the organization in a more efficient manner, and there is also great willingness on the experts' side to take part in the practices for achieving this goal.

Key words:	Expertise, knowledge transfer, knowledge management, governmental organization

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Opinnäytetyön tiivistelmä

Työn tekijä Työn nimi Sivumäärä Päivämäärä	Ville Räisänen Leveraging Expert Knowledge in Conditions of an Organizational Change 66 sivua + 7 liitettä 6.5.2012
Tutkinto	Insinööri, YAMK
Koulutusohjelma	Tuotantotalouden koulutusohjelma
Työn ohjaajat	Marjatta Huhta, DSc (Tech) Thomas Rohweder, DSc (Econ)

Tämän opinnäytetyön tarkoituksena on edelleen kehittää osaamisen ja tiedon jakamisen sekä säilyttämisen käytäntöjä asiantuntijaorganisaatiossa ja näin korostaa osaamisen arvostusta. Kohdeorganisaatio, Liikenteen turvallisuusvirasto (Trafi) on läpikäynyt useita organisaatiomuutoksia lähimenneisyydessä ja näillä muutoksilla oli mahdollisesti vaikutuksia osaamisen ja tiedon hyödyntämiseen organisaatiossa.

Opinnäytetyö hyödyntää yhden tapauksen tutkimuksen lähestymistapaa (single case study), keskittyen vain kohdeorganisaatioon ja laadullinen tietoaineisto kerättiin organisaation yhdeltä osastolta. Tämä lähestymistapa, ottaen huomioon sen rajoitteet, antaa näkymän tämän valtionhallinnon asiantuntijaorganisaation ytimeen.

Laadullista tietoaineistoa kerättiin seuraavista lähteistä: suorittamalla tietämyksen hyödyntämisen auditointi (osaamisauditointi) Trafin Liikenteen teknologia –osastolla ja suorittamalla tapausorganisaatiossa asiantuntijahaastatteluja. Lisäksi tutkittiin organisaation tietoaineistoa. Osaamisauditointi sisälsi kysymyksiä liittyen viimeisimpään organisaatiomuutokseen ja tutki asiantuntijoiden osaamis- ja tietoalueita. Lisäksi kerättiin asiantuntijoiden näkemyksiä liittyen ehdotettuihin osaamisen jakamisen käytäntöihin. Tietoaineisto analysoitiin ja tämän perusteella kehitettiin ehdotuksia organisaation sisäisiin osaamisen ja tiedon jakamisen käytäntöihin.

Tutkimus määrittää tiettyjä osaamisen ja tiedon jakamisen käytäntöjä, joita selvitettiin laajemmin tutkimuksen yhteydessä. Tutkimus paljasti sen, että organisaation hallussa olevaa osaamista tulisi hyödyntää tehokkaammin ja myös sen, että asiantuntijat suhtautuvat myönteisesti tämän tavoitteen mahdollistaviin käytäntöihin osallistumiseen.

Asiasanat:	Asiantuntijuus, tiedon siirtäminen, tietämyksenhallinta, valtionhallinnon organisaatio

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ABBREVIATIONS AND ACRONYMS

DD	Department Director (Trafi)
ELY-Centre	Centre for Economic Development, Transport and the Environment
FTE	Full-time equivalent
HoU	Head of Unit (Trafi)
HR	Human Resources
ICT	Information and Communication Technology
K-mapping	Knowledge mapping
MINTC	Ministry of Transport and Communication
OECD	Organization for Economic Co-operation and Development
Trafi	The Finnish Transport Safety Agency
YTV	Helsinki Metropolitan Area Council

1 Introduction

This Thesis focuses on investigating the possibilities to leverage expert knowledge in a Finnish governmental expert organization, the Finnish Transport Safety Agency (Trafi), in conditions of a major organizational reform. Several times over its first years of existence, the organization has significantly changed its form and functions, and this Thesis attempts to provide organizational practices to retain its high level of expertise and, if possible, to further increase this level.

1.1 Case Company Background

The case organization, Trafi, was established in January 2010 after an overall structural reform of the Finnish transport related governmental institutions. Prior to 2010, the issues related to the various forms of transport were assigned to their respective agencies. Road infrastructure, traffic and transport were handled by the Finnish Road Administration and the Finnish Vehicle Administration; aviation was at the hands of the Finnish Civil Aviation Researcherity; railroads and train traffic were under the responsibility of the Finnish Rail Agency and the Finnish Rail Administration; and, finally, all maritime issues were taken care of by the Finnish Maritime Administration. All these six organizations were then reorganized and put together in two large organizations which resulted in creation of two sister agencies, Trafi and the Finnish Transport Agency. The full-time equivalents (FTE) of the organizations merged are illustrated in Table 1.

MINTC SAFETY AGENCIES (MERGED TO ESTABLISH TRAFI)	**FTE 2009**
Finnish Civil Aviation Researcherity	130
Finnish Rail Agency	41
Finnish Vehicle Administration	234
Finnish Maritime Administration's Maritime Safety Function	133

*) The Maritime Safety Function's FTE includes also other people transferring to the Finnish Transport Safety Agency

Table 1. Organizations merged on 1 January, 2010 to establish Trafi and their respective FTE in 2009 (adapted from Lampinen & Ojajärvi 2009, 83).

Trafi, which is placed in the focus of this Thesis, takes responsibility of the safety of the Finnish transport system, while the Finnish Transport Agency is responsible of the transport infrastructure. The background of the organizations involved in creating the new agency is illustrated in Figure 1.

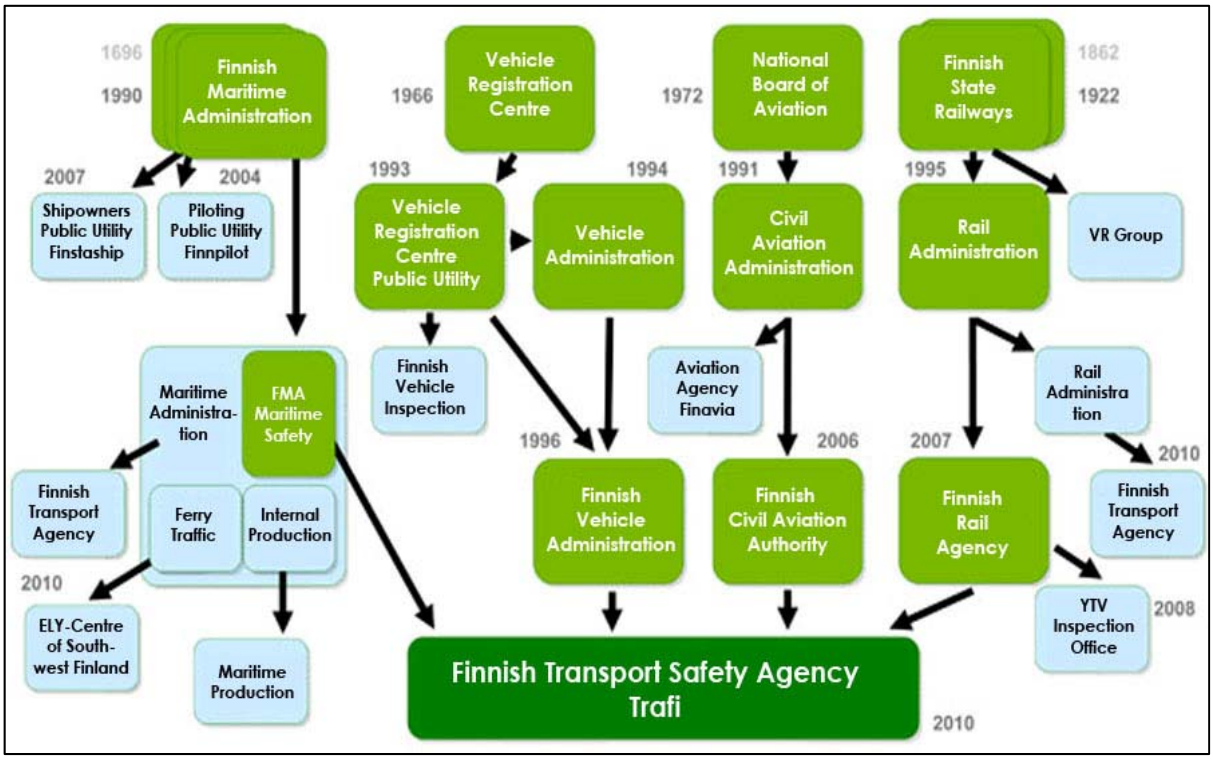


Figure 1. The history of Trafi and the organizations involved (Trafi 2011).

As shown in Figure 1, the organizations involved have themselves gone through changes too, prior to the most recent merger into Trafi. In many cases, the recent changes involve the privatization of some functions; privatization also played a part in the general reform where Trafi was formed. An organizational change of this magnitude causes a lot of challenges for the new organization members, first, because it involved four agencies of various size (shown in Figure 2) and, second, their organizational cultures, which formed in their respective tracks for decades and even centuries prior to the merger. Altogether, the new organization now accommodates more than 500 employees.

A significant impact on the organizations way of functioning, created by this merger, can also be found on the business-side. For example, some of the agencies were more involved in collecting taxes and receiving various payments than the others. Trafi's action report from the year 2010 reveals the revenues collected by the different func-

tions of the organization and especially the difference in their magnitudes. For example, the functions related to road vehicles (vehicle registration, degrees and certificates, etc.) collected approximately 70 M€ in revenues. In addition, the vehicle taxation returns amounted to approximately 700 M€ (these, however, are accounted for as the Finnish Tax Administration's revenues). The air traffic related functions followed with about 5 M€; maritime safety function collected about 2 M€; while the rail traffic related revenues were around 0.5 M€. (Liikenteen turvallisuusvirasto 2011) Arguably, these variances on the financial side of the different forms of transport represented in the organization also had an effect on the different agencies' possibilities to influence the new organization and its functioning.

On the positive side of the merger, all the notable differences that the organizations have brought to the new structure are now accumulated into useful organizational practices, and mixed for all to learn from them.

To further illustrate the different magnitudes of various functions of the organization in 2010 in monetary terms, Figure 2 below shows Trafi's accruals (revenue shares) in 2010 as percentages per function.

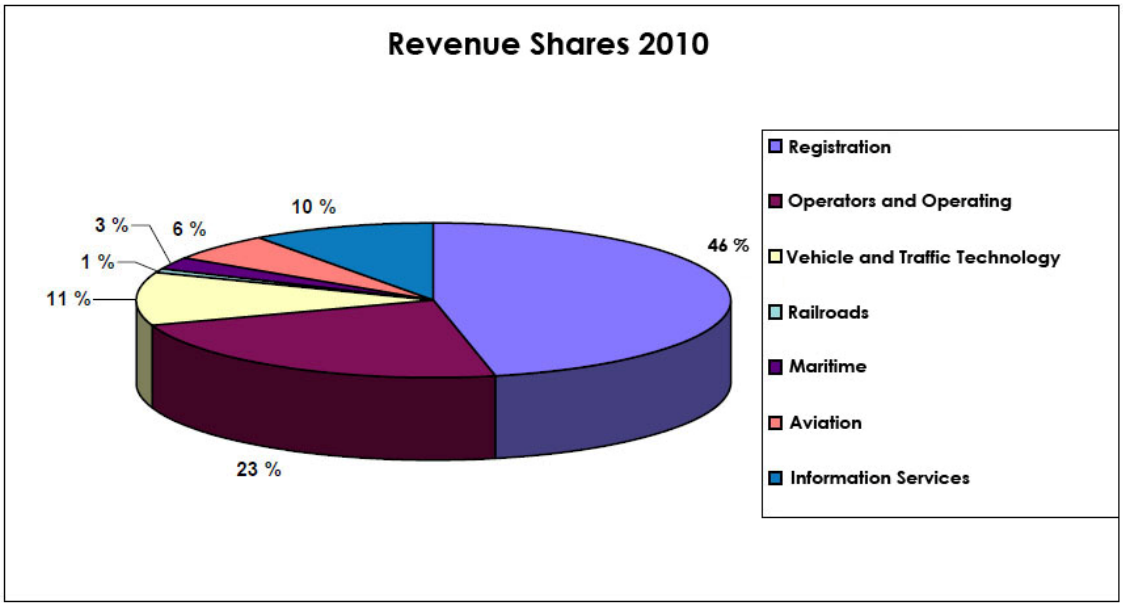


Figure 2. Trafi's revenue shares per function in 2010 in percentage (Liikenteen turvallisuusvirasto 2011: 19).

Depicted in Figure 2, the revenue shares for Trafi in 2010 visualize the differences in the magnitudes of revenues created by different functions of the organization. The

traditionally road traffic related functions, Registration, Operators and Operating and Vehicle and Traffic Technology were responsible for the majority of the revenues with 80% of the total; the remaining 20% being produced by all the other functions together.

In this Thesis, the main focus is placed on the latest organizational reform at Trafi, which was put into force on January 1, 2012, with the first overall reform of 2010 also overviewed in the relevant section, as the starting point leading to today's situation. It may be worth mentioning that, in between these two very large structural changes, there was also a third one, implemented at the end of 2010. This reform, however, which in itself can be considered a major change, was overshadowed by the two even larger reforms carried our subsequently.

The first, original overall transport reform of 2010 was justified by several reasons, financial and productivity issues being the most obvious ones raised up. As stated by the appointed rapporteurs Ojajärvi and Lampinen (2009: description page) in their report, the goal was "in particular, an improvement in productivity and effectiveness within the state's transport administration, as the conditions will be in place for maintaining and developing the transport system service level in an efficient manner overall." To fulfil the goals set for this reform, especially from the service point of view, one could argue that a lot still remains to be done.

Starting from January 2012, a new organizational structure within the Finnish Transport Safety Agency has been put into effect by removing the traditional forms of transport from the organizational structure and treating the transport system as a whole. The leading thought behind this new way of thinking is to gain synergy benefits from the best practices from the different forms of transport. The reform, however, resulted in the majority the organization's experts changing their tasks and, in many cases, taking on a totally new field of duties. These changes in the experts' tasks added to the challenge of the expected increase in retirements in the near future, which in itself may lead to a significant loss of knowledge at Trafi. These problems, therefore, create the main focus for this Master's Thesis.

1.2 Research Problem and Research Question

A large organizational reform may cause the expertise of an expert organization to be vulnerable and subject to being lost. Another, more natural factor putting the knowledge at risk is Trafi's aging expert force and their retirements. In Trafi's case of safety related expertise, the potential loss of it can be considered even more significant as the losses will not be only financial, but can also have an impact on the safety of transport and traffic in Finland. Efficient knowledge management (KM) is, therefore, required, and a functioning process of knowledge transfer is a key tool to any knowledge management system.

The objective of this study is to make the expertise and knowledge in the organization transparent and available throughout the organization. The transparency of areas of expertise will promote transfer of knowledge from the more experienced experts to the newly hired ones, or to the people who have changed their tasks recently. In order to achieve this objective, the most recent 2012 organizational reform will be taken into account to determine the impact of the reform on the utilization of the expertise held by the people in the expert positions. As the organizational structure was comprehensively changed, the expert positions were also restructured; and it is now apparent that only some tasks within the organization stayed as they were. A lot of experts changed their field totally as the chance was given, but the important issue of transfer of knowledge to the ones taking up the tasks which another expert has left behind has not been taken into account sufficiently. Moreover, Trafi's customers remain to be involved in traditional transport methods, and their sector-specific needs have not changed. These customer needs have to be met by the experts even though the organizational structure does not promote these traditional divisions between forms of transport. Finally, another major factor affecting the transfer of knowledge is change resistance, examples of which have surfaced all around the organization.

Taking these challenges into consideration, the research question is formulated as:

- *How to share and retain the existing expertise in an expert organization in conditions of a major organizational reform?*

In search of the reply to this research question, some other questions need to be explored first, namely:

- *How is the expert knowledge utilized within Trafi?*
- *What is the impact of the organizational reform of 2012 on the expertise at Trafi?*

1.3 Research Design and Structure of the Study

This research applies a case study research methodology, based on a single case study design (Yin 2009). The case study in this research is limited to the Transport Technology department of Trafi. However, the background information and the more general analysis of the organizational change also takes into account the organization as a whole. Additionally, the research method is selected bearing in mind its applicability to chart the whole organization's knowledge resources. For this reason, the knowledge audit is chosen as the primary data collection tool, which serves several purposes and answers multiple questions defined in detail in Section 2 of this Thesis. The research design utilized in this study is presented in Figure 3.

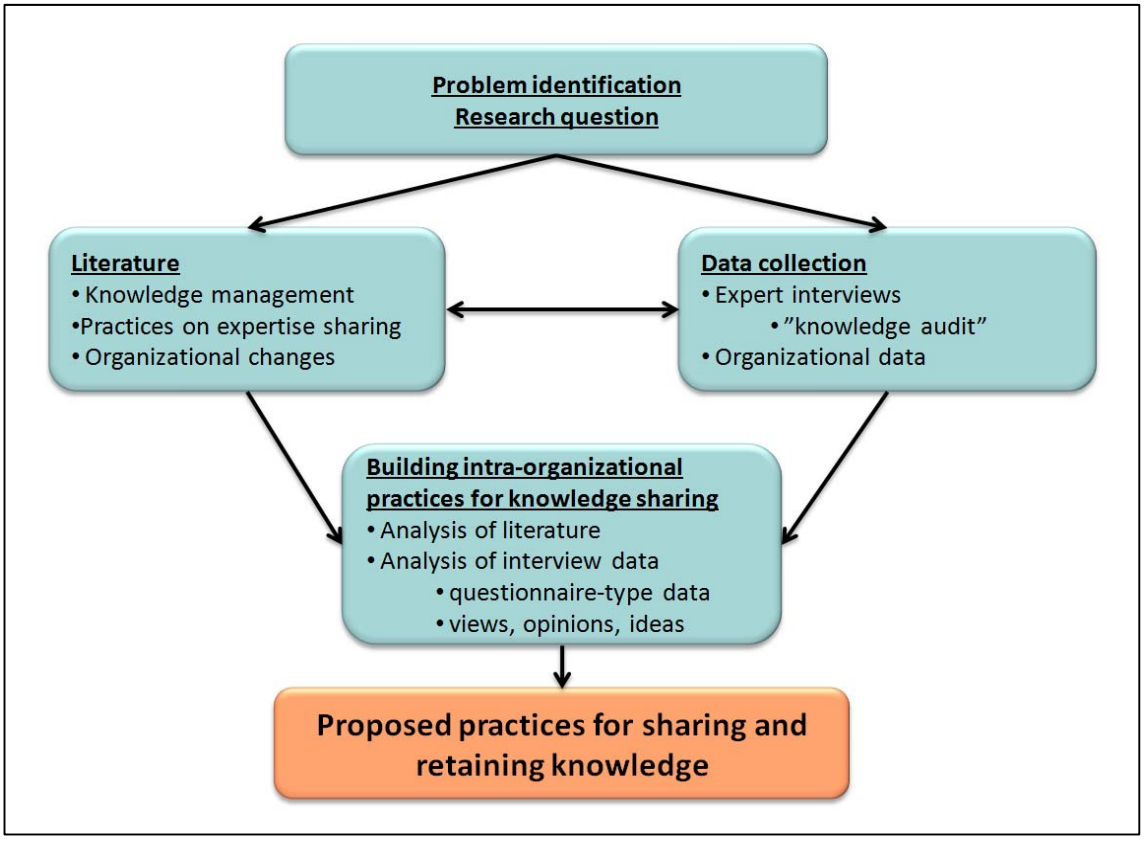


Figure 3. The research design of this study.

As shown in Figure 3, the research starts with the identification of the problem and the research question. The second phase consisted on researching the literature and collecting data; in this phase, the two parts were intertwined and affecting each other constantly. As new information emerged in the data collection, appropriate literature was reviewed and new findings were analyzed based on the literature. The analysis phase aimed at combining what was learned from the literature and the data collected and using that information to formulate and justify the practices presented in the end of this study.

In terms of the structure, the study is organized into six sections. Section 1 describes the background of the organization, the objectives of the study as well as overviews the design and outlines the scope of the study. Section 2 introduces the research approach, data collection and data analysis methods applied in this study. Section 3 analyzes the conceptual framework related to this study and provides background information related to the concepts vital for this research. Section 4 focuses on analyzing the data collected and the formulation of intra-organizational practices proposed. Section 5 presents the proposed practices to implement in the case organization. Section 6 concludes the study, summarizes the results and also overviews the consideration of the reliability and validity issues.

2 Research Method and Material

This section overviews the research approach utilized in this study and describe the data sources and data analysis methods used to address the research question.

2.1 Research Approach

This Thesis utilizes a qualitative single-case study approach (Yin 2009) as its main research approach. The research method is selected to focus the research on a single department of the organization. As Yin (2009) defines, the case study research investigates the real life context of phenomena, the phenomena in this case being the sharing and utilization of the knowledge and expertise held by the experts. The selection of this method is justified by the research question, which aims to resolve issues related to a social phenomenon (Yin 2009: 4) in asking a *"how"* question.

The research can be considered to be a case study of traditional single-case design (Yin 2009), because due to time and resource limitations the case study was not extended beyond the previously mentioned department. Should a similar research be extended to cover the whole organization, a survey-type design would most likely be the option to choose as interviewing in-person more than 500 employees could prove to be too resource-consuming.

The data collected in this study is mostly qualitative, with the exception of a portion of large scale statistical data related to the organizational change acquired from the HR department of the case organization. The primary method of data collection can be described as a knowledge audit, conducted on a limited sample and emphasizing the utilization of the expertise. Therefore, the data collection for this study is further called a "knowledge utilization audit".

Even though this Master's Thesis mostly considers auditing and sharing of explicit knowledge, the importance of tacit knowledge, its recognition and transfer must not be underestimated. As Tirronen (2010) believes, there are always possibilities for taking these more elusive forms of knowledge into account in a learning organization. It can

be argued that the success and effectiveness of transfer of explicit knowledge is, to a large extent, dependent on the level of organizational tacit knowledge of the involved parties. The essential tacit knowledge is the information on organization's practices, knowledge of who knows what, and knowing people. The organization should be aware of the types of knowledge it possesses and who has this knowledge (Tirronen 2010). This is the point where mapping of explicit knowledge will come into play.

If simplified, the data collection phase and the formulation of proposed practices for this Thesis was conducted as follows:

1: Define categories of knowledge to be charted in the knowledge audit:
o Collect information from Trafi's procedure paper (työjärjestys) o Collect information from Department Director (DD), Heads of Unit (HoU) o Create a knowledge audit template
2: Define current state of expert knowledge at Transport Technology department:
o Interviews with Special Advisers, Chief Advisers o Interviews with HoUs and DD o Analysis of experts' tasks before the organizational change of 2012
3: Create practices to get to the desired state:
o Find excess knowledge and knowledge gaps o Find methods of knowledge sharing and transfer most suitable to Trafi o Justify the practices to introduce to the organization o Execution

2.2 Data Collection and Analysis Methods

Data was collected using three main data sources: first, the existing material obtained from Trafi's publications as well as from the Human Resources Department. These organizational data included the lists of all employees' tasks before and after the organizational change as well as the lists of people placed in particular positions after the organizational change. For confidentiality reasons, these lists and data as such are not included in this Thesis but the information useful for the purposes of this study is reviewed in the data analysis section.

What comes to the structure of the group to be analyzed in the process, the Transport Technology department is quite homogenous, as the department general task descriptions can be considered similar in nature. The structure of the department is presented in Appendix 2 of this Thesis. All of the experts, be they chief advisers, special advisers or advisers, are professionals in their own fields and their responsibilities in the department consist of similar tasks described in the type task descriptions. In these descriptions, the tasks and required expertise are superficially defined in order to facilitate the use of one description for several people with the same title. An example of the researcher's previous task description is presented as Appendix 7.

The second source of data is the knowledge audit and the third is a series of interviews with the case company experts, both described in detail in the following subsections. In addition to the defined data collection sources, the researcher has during this study obtained significant amounts of information in an informal way from all levels of the organization. These sources have identified clear problems and have also suggested possible solutions to those problems. These pieces of information should not be disregarded but they will not be included directly in the results of the main investigation as they are not a part of the organizational segment selected for the knowledge utilization audit. These insights, however, make the final conclusions more powerful as justified by Yin (2009), taking the issues into account as coming from separate sources, even though they are treated as general remarks by the researcher.

2.2.1 Knowledge Utilization Audit in General

A knowledge audit is the tool for charting the expertise available for the organization to utilize. The audit interview consists of questions to chart the experts' level of expertise in various areas in predefined categories, including the following fields of expertise: technical, legislative, processes, languages and advocacy (including contacts). The experts were also asked about the utilization of the expertise in the new organizational situation, the answers thus revealing potential excess expert knowledge which can be put to use elsewhere in the organization with the solutions provided. The audit takes into account the effect of the 2012 organizational change to the width of the experts'

duties, the demands of their tasks and the efficiency of the utilization of their expertise. The structure of the knowledge utilization audit is shown in Figure 4.

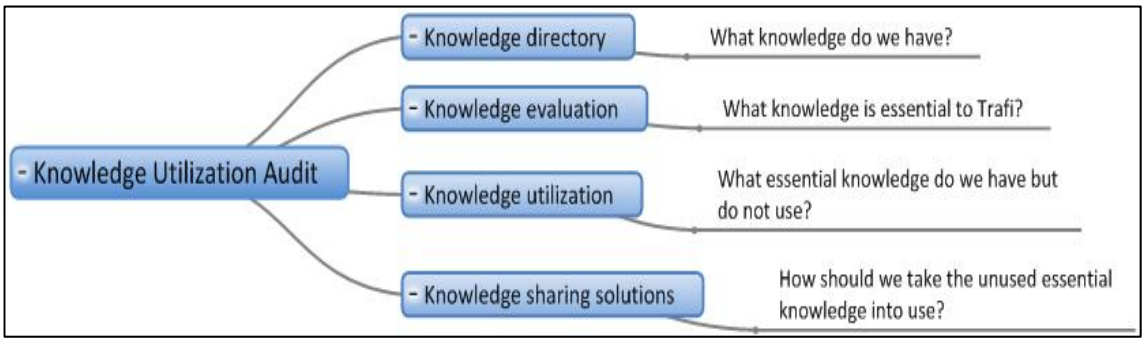


Figure 4. Knowledge Utilization Audit purposes.

Figure 4 describes the constituents of *the knowledge utilization audit* created for the purposes of this study and the questions the audit aims to answer, namely: *knowledge directory, knowledge evaluation, knowledge utilization,* and *knowledge sharing solutions.* The audit serves as a simplified version of knowledge mapping and knowledge utilization investigation. The audit is described in more detail in Sections 2 and 4 of this Thesis.

The knowledge audit took into account the subjects' age and background at Trafi or the predecessor agencies, and the areas of expertise *(knowledge directory);* this information was also used for the purposes of the knowledge loss risk assessment. For the same purpose, the experts were asked to provide an estimation of how long they see themselves working for the organization. The main purpose of the knowledge directory was to provide insight to the utilization of the expertise and knowledge held by the experts. Age is a factor in the final conclusions and recommendations as retirements are planned and this will accommodate the need for further sharing the experts' knowledge.

The audit presented in Figure 4 was conducted on a limited sample, in the Transport Technology department only, to determine the expertise held by the department's staff and the effect of the organizational change on the utilization of the expertise held. As the specific duties of most of the department's experts are formed around their already existing expertise, the definition of *the knowledge needs* was suggested simultaneously with the knowledge audit. These needs are currently covered by the experts; however,

the situation may change at any time, and there must be a method in place in order to prevent knowledge gaps from forming.

Currently, the knowledge needs are defined by the organizational structure; however, the underlying driving factors are various. As the organization in question is a governmental agency, a lot of the needs are defined by statutory tasks of the organization. In addition, the customers' needs provide the framework for several tasks in the operational environment. This study, however follows the approach described by Otala (2008) of facing the precision needs of the organization as they are formed in the starting months of the new organizational structure. Still, the aim is to find long-lasting solutions which will be as useful in the future, too. As the organization is constantly developing, *the knowledge sharing solutions* provided must be flexible and allow for development to cater to other possible changes in the organization.

The primary research method of the knowledge audit was personal interviews of experts working in the selected department. The audit and interview schedule is presented in Table 2 on page 14. The personal interviews were conducted based on a "checklist" which structured and standardized the interviews in order for the majority of the data to be comparable. In each interview, there was also some room for more informal discussion to accommodate possible knowledge sharing solutions discussed during the interview. The audit form created for the purposes of this study is presented as Appendix 6 to this Thesis.

Along with the knowledge audit, the supervisors (Heads of Unit and Department Director) were involved in the evaluation of the findings and the solutions for the department. *The knowledge chart* resulting from the knowledge audit reveals the expertise possessed by the department and its utilization in the new organization. The knowledge chart is not to be publicized as such in this Thesis, as the information acquired can be considered in part confidential. The chart is analyzed and reported on in general terms, in terms of its contents, the magnitude of expertise in the department and some select details given in the analysis section in Section 4 of this Thesis. The most significant result from the charting was revealing the cases where an expert has a high level of expertise which is not currently utilized in an area significant to the or-

ganization. These cases, along with the questions directly related to sharing expertise, provide the justification for the final outcome of the study.

After discussions with the management, it became obvious that the knowledge auditing should be conducted not only at the expert level, but also for Heads of Unit and Department Directors, too. As the organizational reform took place on 1 January 2012, it was almost immediately realized that the supervisors were unaware of their subordinates' specific tasks and the expertise they possess. However, the knowledge mapping conducted at the supervisor levels should be a different one from the one held for experts. Supervisors need to posses not only the expert knowledge, but also overall organizational information on who knows what and does what tasks. Due to time limitations, the supervisor audit is not included in this study; however, the results of the expert audit are to be presented to the supervisors for additional validation, and their insights without doubt taken into account when developing proposals the case department.

2.2.2 Interviewing Experts

The interviews as a data collection method were conducted following, for the most part, a survey protocol (Yin 2009). The suggested interview formats were semi-structured interviews, but they left some space for the interviewees at the end of the interview session to describe their expertise areas. The interviews for the knowledge utilization audit were designed in such a way that the numerical answers related to the mapping itself do not leave room for variables, unlike quantitative statistical methods often leaving some room for error (Alasuutari 1993). The audit also provided specific examples of knowledge and expertise areas in order to keep the results even more precise. The interviewees were also given some space in the additional questions to provide suggestions for improvement in the organization's knowledge management and knowledge sharing practices, as well as for expressing their opinions in an in-depth type of questions. This part, however, is not included in the data collection as such, except for the suggestions for improvement concerning the organization's knowledge management overviewed in the conclusions.

As possessors of (and the ones who require) knowledge, the experts naturally have their own views on the most effective knowledge transfer methods and other possible solutions for the case organization. The main goal of the interviews was, first of all, to obtain concrete information on the knowledge and expertise possessed by the Transport Technology department's experts. The results of the interviews were analyzed and also anonymized. From these pieces of information, the most critical improvement areas can be derived to justify the proposed models of knowledge sharing.

Auditees	Position	Date	Documentation
1	Chief Adviser	19 March 2012	Field notes
2	Chief Adviser	15 March 2012	Field notes
3	Chief Adviser	16 March 2012	Field notes
4	Special Adviser	14 March 2012	Field notes
5	Special Adviser	15 March 2012	Field notes
6	Special Adviser	16 March 2012	Field notes
7	Special Adviser	19 March 2012	Field notes
8	Special Adviser	20 March 2012	Field notes
9	Special Adviser	21 March 2012	Field notes
10	Special Adviser	15 March 2012	Field notes
11	Special Adviser	19 March 2012	Field notes
12	Special Adviser	19 March 2012	Field notes
13	Adviser	15 March 2012	Field notes

Table 2. Interviews conducted with the experts in the Transport Technology department.

Table 2 presents the interviews conducted in the Transport Technology department, the interviewees' titles, the interview dates and the method of recording the data. The data was recorded utilizing the knowledge utilization audit form presented as Appendix 6 of this Thesis as well as handwritten notes which were thereafter transcribed and presented to the interviewees for comments.

The interview form was developed in a questionnaire format and composed of three basic parts. The first part, Segment A, consists of general questions related to the ex-

pertise and the effects of the organizational change. These questions were answered on a five-point Likert scale, ranging from “very negative” through “no change” to “very positive”, the exact terms used varying according to the question.

The second part, Segment B, of the interview and the questionnaire formed the basis for listing the relevant knowledge of the experts, according to their own opinion. This list is divided into eight areas, as presented in Figure 5, along with the relevant organizational duties as justification for the selection of each area:

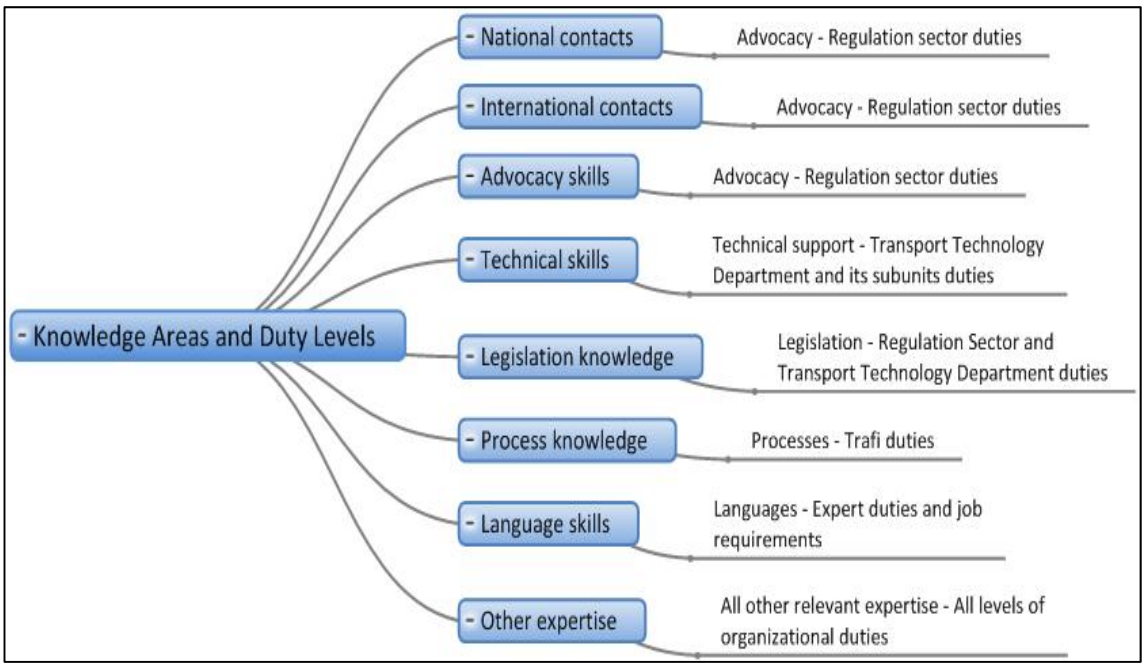


Figure 5. Interview and questionnaire knowledge and expertise areas.

As can be seen from Figure 5, in Segment B, the focus is placed on the experts’ views of the specific areas of knowledge or lack thereof. These expertise areas were graded by the experts on a five-point Likert scale, the first “expertise level” part ranging from “no knowledge” through “intermediate” to “expert” and the second “utilization level” part ranging from “no utilization” through “mediocre” to “very well utilized”. The numerical values were intended to clarify these questions for the auditees as well as the auditor and were also used as an indication for the actions needed in the analyzed area. In the future, these numerical values also can be utilized for rating the knowledge of n expert that he/she is willing to present as his/her expertise areas when the expertise is made public. A value of 4 or 5 in the expertise column is also an indication that the auditee is someone very qualified to help others with this knowledge area as well and can potentially act as a mentor in this field.

The third part of the interviews, Segment C, was related to various methods of knowledge sharing and transfer, and the experts' willingness to participate in them. In this part, there was only one segment graded on a five-point Likert scale, unlike the previous parts, after which the questions are either open-ended or polar. The polar yes/no-questions left room for additional comments by the experts, which can be considered useful in the analysis. These questions were formulated to give additional insight to the knowledge audit issues as presented by Liebowitz et al. (2000) and depicted in Figure 10 on page 34**.**

2.3 Reliability and Validity

The research for this Thesis and data collection were conducted taking into account the reliability and validity issues. Overall, since the sample for the main data collection is small (n=13), this does not allow for generalizations, but calls for further studies of the issues to be researched more comprehensively.

Yin (2009) presents four design tests of reliability and validity and the related case study tactics. The tests include *construct validity, internal validity, external validity* and *reliability*, the selected tactics and the success of addressing the reliability and validity issues are discussed in Section 6 of this Thesis.

As Silverman (1985) quotes Denzin (1970), the open-ended interviews are preferable for three reasons. First, they allow the respondents to use their 'unique ways of defining the world' (Denzin 1970: 125); second, they assume that no fixed sequence of questions is suitable to all respondents; and finally, they allow the respondents to 'raise important issues not contained in the schedule' (Silverman 1985: 162).

To tackle internal validity, the data from the open-ended discussion are recommended to written down during the interviews in a notebook and immediately after the interview the notes should be transcribed to the interview form. The form with all the questionnaire-type answers as well as the open-ended notes should subsequently be validated with the informant to enhance the reliability of the obtained data.

As the data collection is conducted combining a questionnaire-type form with a more open-ended qualitative interview, there are certain aspects that should be taken into account. As Alasuutari (1993: 41) points out, producing observations and explaining as two methods of research have two distinct phases in the research process. These two phases are compared to each type of research in the following table.

	Questionnaire research	Qualitative research
Solving a mystery	Causal analysis, interpretation of statistical connections, referencing other research and hypotheses.	"Appreciatory explanation", referencing other research and theoretical frameworks.
Producing observations	Defining and coding variables, searching for averages and statistical connections.	Reducing the observations: Focusing on the "essential" and combining raw observations.

Table 3. Different research phases of questionnaire-type and qualitative research (translated from Alasuutari 1993: 42).

Table 3 shows the differences in the nature of conducting a questionnaire-type and qualitative research. As the research for this study attempts to combine these two methods, this table is to be reviewed in the end of the research to shed light on the success of the research in covering the areas presented in the table. As Alasuutari states, the data collected in the questionnaire-type research is limited already in the construction phase when the questions are formulated. In an open-ended qualitative interview, the limiting of the data collected must take place as well; however, this limiting and eliminating of the subjects is for the most parts done after the interview (Alasuutari 1993).

3 Conceptual Framework

This section presents the conceptual framework compiled for the purposes of this study form the relevant literature sources related to the study field. Firstly, the field of organizational changes in the public sector is considered, with the closest examples being found in Sweden. After that, the constituents of the conceptual framework are drawn from the field of knowledge and expertise sharing and transfer as well as particular practices selected for further investigation within this Thesis.

3.1 Organizational Change in the Public Sector

One could argue that as long as there have been organizations, there have been organizational changes. As Paton and McCalman (2008) state, change can be even seen as a constant and management and change are synonymous. The reasons behind the need for change can come from outside the organization or from within; however in all the cases, change management and change leadership play the key role in achieving success. Change management is a subject comprehensively studied and countless volumes of literature exist. Still, according to Paton and McCalman (2008), managers report change failure rates as high as 70 per cent in organizational changes.

Kotter (2011) points out the difference between change management and change leadership. If simplified, change management is the tool kit for pushing the change along while keeping everything under control. On the contrary, change leadership consists of the so-called engine of the change; involving people wanting to see change, their ideas, visions and the sense of urgency. Kotter (2011) argues that no one is very good at change leadership yet and this is an issue of the management of the organizational studies.

Organizational changes are increasingly taking place also in the governmental sector. The examples are various and there are several cases which are comparable to the Finnish transport administration reform to be found in the recent past. In Sweden, a similar transport administration reform has taken place as well as another reform concerning the insurance, taxation and prosecution researcherities. Comprehensive reports on the Swedish transport administration reform are unfortunately not available, how-

ever some investigations have been conducted by the Swedish National Audit Office (Riksrevisionen) and reports made on certain parts related to the reforms' goals. According to Riksrevisionen (2011), the transport administration reform did not succeed in improving the productivity but rather caused a decline. As Riksrevisionen (2011) states in its summary, it will take time to reach the goals set for productivity by the government.

In reference to the other abovementioned Swedish reform, Riksrevisionen (2010) has found out that the goals have been missed as well. One of the driving factors behind the reform or merger was the goal of having more uniformity in the agencies' ways of working. Approximately five years after the reform, it was determined that there had been no significant improvement and the variations in the practices by the civil servants had a significant impact also on the individual customers (Riksrevisionen 2010). Additionally, after interviewing the officers whose tasks were affected by the merger, it became apparent that due to specialization and centralization of case management, some informal internal structures were formed which caused difficulties for the management and made the organization difficult to survey. In his report, Riksrevisionen (2010) recommends that the researcherities concentrate more on developing the uniformity of their practices. This can be a useful lesson for the reform at Trafi as well and the promotion of expertise sharing can be at least a partial solution for this issue. When the best practices are openly shared, expertise areas are openly visible and the knowledge is systematically retained, the possibilities of negative variance in the experts' practices are also minimized.

3.2 Knowledge and Expertise

In this Thesis the concepts of knowledge and expertise are treated as closely related and somewhat intertwined subjects. A definition of knowledge, according to Webster's Dictionary, is: "The act or state of knowing; clear perception of fact, truth, or duty; certain apprehension; familiar cognizance; cognition". Expertise, on the other hand, is defined in the BusinessDictionary.com (2012) as the "Basis of credibility of a person who is perceived to be knowledgeable in an area or topic due to his or her study, training, or experience in the subject matter".

For the purposes of this study, the definition of knowledge is adopted form Ahmed et al. (2002: 10) where knowledge is defined as information with intelligence added to it. Expertise, in its turn, can be defined, for the purposes of this study, as the application of acquired knowledge to the duties given by the organization. The study attempts to map the employees' expertise in the case organization and provide possibilities to its sharing and retention, as well as tracking down other knowledge options possessed by the employees which could potentially be transformed into expertise.

Ahmed et al. (2002: 10) make a reference to Polanyi's (1966) definition of tacit and explicit knowledge, with explicit knowledge being the knowledge which is "easily written down or codified" and tacit knowledge being "that which is very difficult to describe or express". It should be noted, however, that this difference is not considered in this study as a significant factor. The areas of knowledge and expertise are only defined as separate in the knowledge audit, not their tacit or explicit nature.

Knowledge management is what an organization needs in order to successfully combine the aspects of people and their knowledge with technological aspects, organization's processes, organizational strategy and the organizational culture (Ahmed et al. 2002).

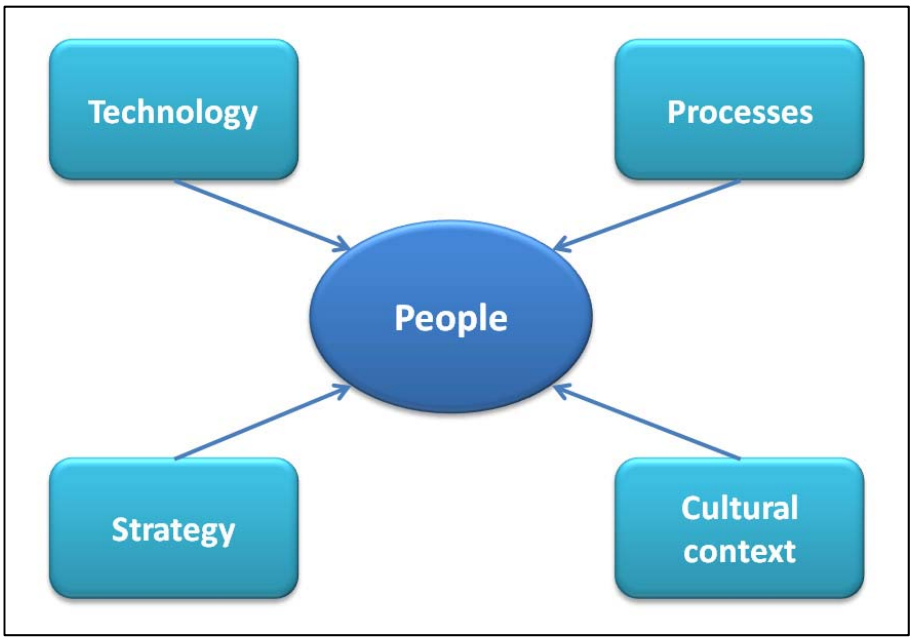


Figure 6. Key elements in knowledge management (Ahmed et al. 2002).

Figure 6 depicts the key elements of knowledge management for an organization. According to Ahmed et al. (2002: 12-13), knowledge management should not be considered separate from the organization's other activities, but should rather be taken as an integral part of an organization's strategy. The knowledge creation process has two key activities, collection and connection, and these two, respectively "capturing and dissemination of know-how" and "linking people who need to know with those who do know", must be kept in balance to achieve success in knowledge management.

3.3 Knowledge Transfer and Sharing

The methods of knowledge sharing are various and, for the purposes of this Thesis, merely some of them were selected in order to meet the urgent needs to improve the knowledge management and expertise sharing at Trafi.

An organization, as the one studied here or any other one, is better off making a decision to become a learning organization. The process of becoming a learning organization, however, is not simple, although there are multiple guidelines how to achieve this state. In an expert organization such as Trafi, one of the most important general principles for a learning organization as described by Otala (2008), is valuing the organizational learning and common practices above individual expertise. The task may be tedious, as people tend to be quite protective of this valuable possession of knowledge, but if the experts can see the value of their expertise from the organization's perspective, success may follow. This requires for the management to take on new practices and possibly concrete incentives to introduce the new way of thinking.

Figure 7 depicts the organizational learning and knowledge sharing cycle.

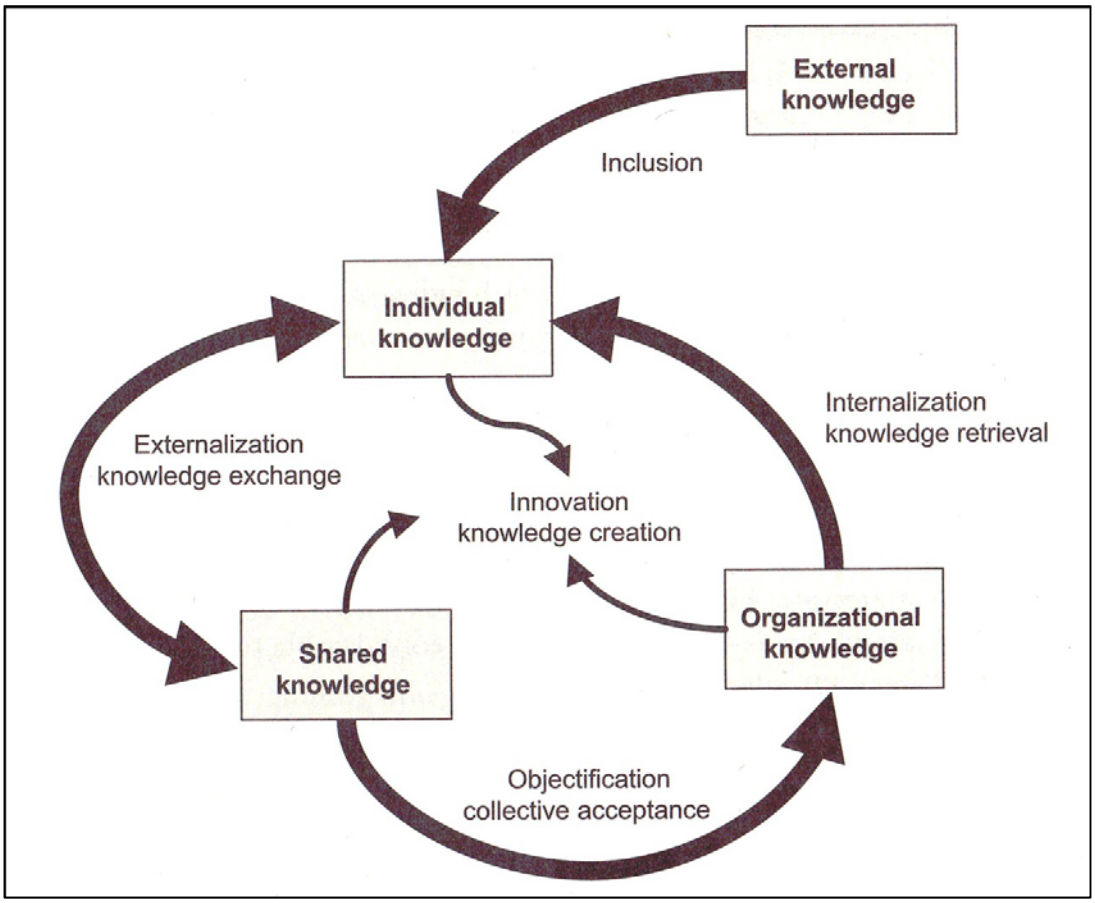


Figure 7. Internal organizational learning and knowledge sharing (Huysman and de Wit. Cited in: Ackerman et al. 2003).

As Huysman and de Wit describe (cited in: Ackerman et al. 2003), there are three basic types of knowledge sharing which comprise the knowledge sharing cycle as depicted in Figure7: *knowledge retrieval, knowledge exchange* and *knowledge creation*. The methods proposed in this Thesis can solve the problems related to all of these, some more widely or superficially and some with a more specific, deeper focus.

3.4 Resistance to Knowledge Transfer and Sharing

Change resistance has been discussed in many scientific publications. Researchers agree that, prior to an organizational change, change resistance is a major factor that comes as obstacle to effective knowledge transfer. According to Paton and McCalman (2008), any transfer of a valuable asset from one party to another requires mutual trust from the involved parties. Knowledge transfer is a prime example of this state-

ment, and quite often, in an organizational change, there is a lack of trust visible between the parties.

Building trust is a time-consuming process (Paton and McCalman 2008) and in the case of a fast-paced organizational change, it may be difficult to build it timely, making it all the more important to have the remedies present once the change has taken place (or even before that). The difficulty in knowledge transfer may originate from the source, the recipient or the context of the knowledge being transferred (Szulanski 1996: 31).

In a change situation, the lack of motivation to share knowledge points to the source as the individuals possessing the knowledge. According to Szulanski (1996), such an individual may fear losing ownership, a position of privilege, or superiority. The recipient on the other hand may lack motivation, absorptive or retentive capacity which are necessary for effective knowledge transfer to take place. As for the context of knowledge, it may be somewhat lost, at least momentarily, as the changing organization itself is in turmoil. In addition to the source, recipient and context, Argote (1999) points out that competition between units within the organization also provides challenges to effective knowledge transfer.

The organizational change and change resistance put aside, the difficulties in knowledge sharing can, according to Ahmed et al. (2002), be divided into two distinct categories. The first, “knowledge is power”, is strongly related to the resistance factors described above and simplified means protecting one’s own turf. This is merely natural as people have gone through significant careers in order to achieve the knowledge and expertise they have and it is something one does not easily want to give up for free. As knowledge is considered power, people tend to keep it locked away and all the experts’ personal computers are prime examples of this protectionism with their password-only-access (Ahmed et al. 2002).

The second category proposed by Ahmed et al. (2002) which provides difficulties in sharing is “knowledge sharing is not my job”. This is also quite easy to relate to as people have their daily duties which may take more than their fair share of the office hours and the learning or sharing process would be an “add-on” or even a nuisance to the work that they are really paid for (Ahmed et al. 2002). These additional tasks, according to Ahmed et al. (2002), would in many experts’ view also lead to loss of

"power" in the form of knowledge and therefore the resistance to the sharing and learning culture is further increased.

3.5 Selected Practices of Knowledge Sharing

For the purposes of this study, only a limited number of practices of knowledge and expertise sharing were considered. The ones selected after review of the relevant literature and taking into account the organization's current situation are an electronic wiki tool, improving the substitution system, in-house mentoring and the further development of the yearly expertise discussions.

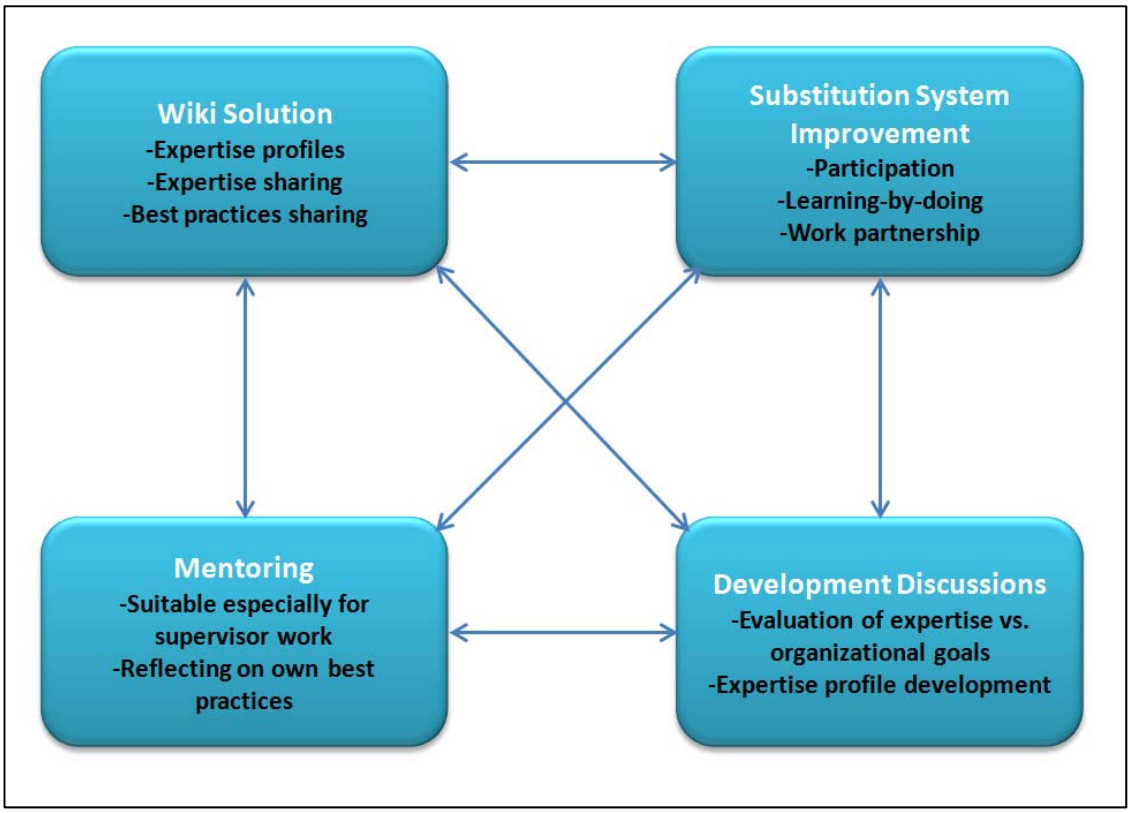


Figure 8. Knowledge sharing practices selected for the purposes of this study.

Figure 8 above shows the practices of knowledge sharing selected for evaluation in this study and their respective main areas of possible improvement to the current situation at Trafi. These practices and their justification are briefly described below and the practices are reflected upon in more detail in Section 5 of this Thesis.

An ever increasing trend in organizations is the utilization of electronic tools to function more efficiently. The trend is reached also to knowledge management. A solution as simple as introducing people's expertise areas more comprehensively into the organization's phone book may solve many problems as the expertise can otherwise be lost in the organization. An improvement to this is providing the knowledge seekers with a good search function. As Ehrlich states in Ackerman et al. (2003), locating the right experts within the organization is often more fruitful for a person in need of help than locating the information required for a specific problem. The best answer to a question may require interpretation and the expert may be able to provide just this while merely finding stored information may be misinterpreted. Named as an expertise locator in Ackerman et al. (2003), the solution in its most simple form can locate expertise, including the explicit and tacit knowledge of the experts. When taken some steps further, the solution can be called a wiki, an interactive website the contents of which may be modified by the users (Henriksson and Mikkonen 2008).

The application of wikis in several Finnish organizations has been studied by Henriksson and Mikkonen (2008) and the results of this study are encouraging, to say the least. The benefits of a wiki (or an expertise locator) solution for knowledge sharing will be apparent on individual as well as organizational level (Ackerman et al. 2003), if the solution is designed in sufficient detail and promoted and taken into use with the appropriate enthusiasm.

Wikis are said to revolutionize the organizational information management towards a more open, more equal and more global direction. In addition to bringing new technology to create more efficient and flexible information management, the wikis, often related to a more comprehensive organizational change, teach a new working culture within the organization (Henriksson and Mikkonen 2008).

The wiki tool can be considered an interface to the organizational knowledge map. As a start, the knowledge map interface can be seen as a "Yellow Pages" solution (Serrat 2008). However, it is vital that the database is created in such a way that allows development in time for the system to grow to a more comprehensive inventory and a tool for all knowledge management needs of the organization. In fact, during the course of this study, in the beginning of April, 2012, Trafi introduced a new version of the tele-

phone directory where experts can list their duties and edit limited information on their profile page. The researcher's profile edit page can be found as Appendix 4 of this Thesis.

In the best-case-scenario, the wiki tool proposed can become a social medium which will promote also other communication and knowledge sharing, rather than merely formal organizational knowledge. The meaning here is not to create another version of Facebook for personal matters, but rather to allow for informal work-related communication to happen in everyone's view. The system administration should be very critical to censorship of the shared views and ideas as this could make the system wither.

A substitution system consists of a methodical appointment of substitutes to each expert's main tasks. The orientation of the substitute does not have to necessarily be a cumbersome task. In the best case, the substitute system would promote the sharing of knowledge and best practices in a very informal way. As Nonaka et al. categorize in Dierkes et al. (2001), the substitution system's learning process is one to increase knowledge internalization. This involves a certain explicit knowledge created by an individual being shared in the organization, thus allowing the substitute to gain the new knowledge in a learning-by-doing process. When the knowledge about, i.e. best practices, once more becomes tacit knowledge for the substitute, it will be turned into the material for new knowledge creation (Nonaka et al. Cited in: Dierkes et al. 2001) as the practices are applied in the substitute's own tasks.

The concept of in-house mentoring is a viable option for developing best practices and sharing senior experts' knowledge of these practices. Mentoring, as is presented by Sullivan (2000), is not necessarily a direct sharing of the mentor's knowledge, but instead it gives the possibility for the student to reflect upon the current practices and improve them, if needed. The student may optimally end up viewing his or her own experiences from a different angle, thus creating new knowledge and expertise.

In addition to naturally occurring self-monitoring, a widespread practice in all types of organizations is having annual or semi-annual development discussions. In the case organization, there are two discussions per year; the autumn discussion being expertise-oriented and the one held in the springtime being results-oriented.

As described by Toivonen in Huotari and Lehto (2009), expertise in an expert organization, especially a governmental one differs fundamentally from the private sector. This difference can also be seen in the needs for development and expertise discussions.

The results-orientation of the private sector is replaced in governmental expert organizations by the majority of the experts being involved in knowledge work, analysis and problem solving. This provides the supervisors with challenges, as the expert work is based on a high level of expertise (Huotari and Lehto 2009: 98-99). The supervisor cannot be expected to have the same level of expertise in all the areas the subordinates excel in. The discussions instead should be aimed at guiding the experts towards organizational goals, rather than the goals in their own area of expertise.

3.6 Auditing Knowledge

Serrat (2008) draws the broad specifications for a knowledge audit constituents. The analysis reveals the knowledge possessed by the individuals, groups and, finally, the knowledge that the organization possesses. In this analysis, it is also discovered what knowledge the experts or work units do not have but which they would need to perform better (Serrat 2008).

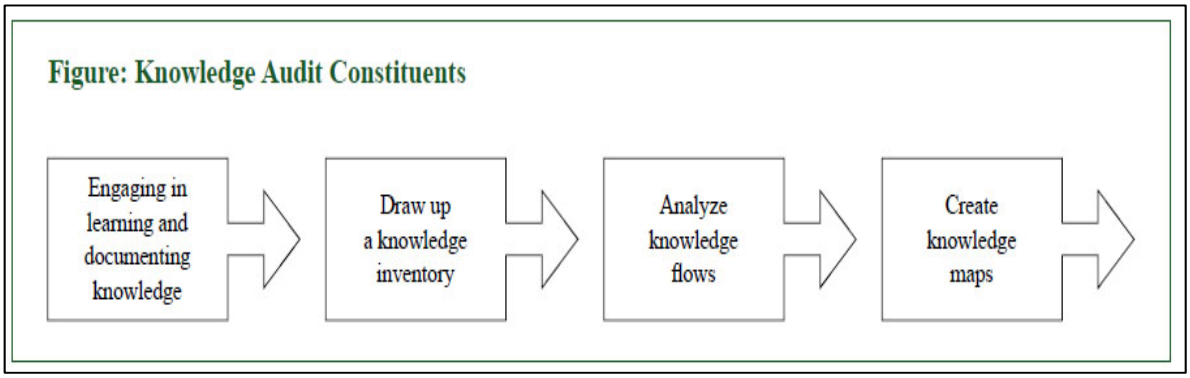


Figure 9. Knowledge Audit Constituents (Serrat 2008).

As can be seen from Figure 9, the first step in the knowledge audit is *engaging in learning and documenting knowledge,* which would involve, among other measures, identifying the knowledge needs in the organization (or a segment thereof, as is the

case in this study). The second step to take after analyzing the knowledge possessed and needs is to *draw up a knowledge inventory*, as depicted in Figure 9 (Serrat 2008). In this study, the knowledge inventory will not cover every aspect of knowledge held by the experts, but will rather concentrate on the expertise related to the statutory and organization-specified tasks and processes: knowledge of legislation, interest group contacts, advocacy skills and communication and technical expertise. The detailed interview questionnaire can be found as Appendix 6 to this study.

The two last constituents of knowledge audit constituents given by Serrat (2008) are *analyzing knowledge flows* and *creating knowledge maps*. Both of these are considered in this study as well; however, to thoroughly assess the knowledge flows within the case organization, the audits must be conducted in most, if not all, the departments of the case organization. According to Serrat (2008), the knowledge sharing practices, subsequently proposed based on the knowledge audit, should promote the creation of new knowledge flows and enforce the existing ones. In order to provide an organization-wide view of the knowledge possessed and available, the proposed knowledge sharing method should be preceded by a comprehensive knowledge audit.

Serrat (2008) also points out that a preferable approach to a knowledge audit is to conduct the audit at one organizational segment (or some segments) at a time rather than the whole organization at once. This approach suits the limited time frame for this Thesis as well, however in order for the organization to gain comprehensive information on the knowledge possessed and the whereabouts of it, the auditing process should be further extended. The format presented in this Thesis is easily translated into a web-based (or other electronic) questionnaire, which would make it more feasible to conduct the audit on a larger scale.

The organization which has taken steps towards improving its knowledge management, should take transparency of the organization's knowledge into special account and leave room for improvement in this area. Gerard Aubertin defines knowledge mapping's necessity as a strategic entry point to knowledge management (cited in: Boughzala and Ermine 2006). He emphasizes the loss of knowledge and crucial know-how and the loss of development opportunities being increasingly considered as major risks by companies, whose intangible capital represent a prime resource. Trafi is most

definitely such an organization, the functioning of which depends solely on the expertise of the employees.

Overall, one of the goals of the knowledge audit is to define knowledge available within the organization *(who knows what?)* as well as to serve as a basis for a knowledge criticality study (as discussed by Boughzala and Ermine 2006). For identifying knowledge (cognitive resources), Boughzala and Ermine (2006) suggest three possible approaches; *functional, procedural* and *conceptual*. Out of these three, a combination of the functional and conceptual approaches will most likely be the best alternative for this study as it aims at identifying knowledge based on an organization chart (functional) and allows also mapping the location and utilization of complex knowledge (conceptual).

The key questions for knowledge mapping should elicit, according to Tandukar (2005), the following responses:

- What knowledge is needed for work?
- Who needs what?
- Who has it?
- Where does it reside?
- Is the knowledge tacit or explicit?
- What issues does it address?
- How to make sure that the K-mapping will be used in an organization?

Tandukar (2005) stresses that the knowledge maps should be easily accessible to all in the organization and easy to understand, update and evolve. They should also be regularly updated, and the knowledge mapping process should be an ongoing one since knowledge landscapes are continuously shifting and evolving. In the case organization, the maps can be generated on a separate intra-organizational wiki site or, if preferred, the organization intranet site, and the expertise lists can be attached to personnel contact information.

Liebowitz et al. (2000) presents the purposes of the knowledge utilization audit as depicted in the Figure 10 below. It is visible that a single solution can help resolve several

problems, at least, partly as is the case in, for example, the wiki solution and expertise database.

Figure 10. Knowledge audit goals for identification (Liebowitz et al. 2000) and the solutions proposed by this Thesis.

As can be seen from Figure 10, *information glut or scarcity* can be tackled by the auditees' expertise lists analyzed bearing in mind the "utilization factor" included to each knowledge area. When, for example, a knowledge area is given a low value and the utilization is given a higher value, it indicates that the required knowledge is not present even though it would be useful, therefore, pointing out to scarcity (Liebowitz et al. 2000). On the other hand, when the values are reversed, there is information (knowledge) glut apparent and the knowledge could be utilized better.

The lack of awareness of information elsewhere in the organization, as presented in Figure 10 by Liebowitz et al. (2000), can for most parts be solved by increasing visibility in the presented solutions and providing open access to all the areas of expertise.

To establish the lack of this awareness, the auditees should be asked directly whether they are able to find needed (missing) knowledge within the organization.

The issues presented in Figure 10, based on Liebowitz et al. (2000), have contributed to the formulation of the questionnaire-type form which is used as the basis for the interviews of the experts in this study.

In general, the knowledge utilization audit in its open questions takes also into account the ability to keep abreast of relevant information, “significant reinventing the wheel”, use of out-of-date information as well as knowing where to go for expertise in a specific area (Liebowitz et al. 2000). As it was demonstrated in Figure 10, several issues may be tackled in a single question, or possibly a single issue may take multiple questions to cover. In any case, the audit conducted and the results intended can be seen as addressing these issues significant for the purposes of this Thesis.

Summing up, the main focus of this section was on proposing a totally new concept for Trafi, a wiki solution; however other methods are considered as well. None of the proposed methods are exclusive; that is all of them may be useful even when used simultaneously. In fact, the methods are more than likely to reinforce each other rather than undermine each other’s success. The relationships of various types of knowledge, its sharing and the organizational learning were analyzed following the approach described by Huysman and de Wit in Ackerman et al. (2003) and depicted as a knowledge sharing cycle in Figure 7. From the knowledge sharing cycle, it was derived that the different types of knowledge, when shared appropriately, promote innovation and new knowledge creation. The focus in this section was placed on collectivization of the knowledge possessed by the organization or the individuals within. When knowledge is seen by all in the organization as a strategically important asset, the success in knowledge sharing and organizational learning is far more feasible.

4 Data Analysis

This section describes the results of the current state analysis based on the data obtained in the case organization.

4.1 General Observations from the Audit

The data acquired in the interviews is analyzed in three main phases. The data collection was formulated into three separate segments as described further on in the analysis and these segments were then analyzed accordingly. As the interviews were semi-structured, with a questionnaire-type form attached but still leaving room for open discussion, a lot of valuable information was gathered during the interview. These pieces of information, opinions and views were included in the open field at the end of the form in the transcription phase. The information was also cross referenced where necessary. After transcription, the forms were sent to the auditees for possible comments or corrections. In the end, no additional comments or corrections were received.

The audit interview request was sent out to all the 14 experts of the Transport technology department, excluding the researcher. 13 interviews were scheduled; one expert spending his last days in the organization before retiring was excused due to scheduling problems. The excused expert is not considered as part of the sample for this study. However, as the questionnaires were numbered from 1 to 14 along with the respective experts, this change in plans results in expert number 10 missing from all the data. Thus, Segments A, B and C all have a sample of 13 experts which can be considered complete, despite one excused retiring expert. The answers from the 13 experts are considered a reliable representation of the general situation in the department. Naturally, due to the specific natures of different departments at Trafi, an organization-wide questionnaire would most likely yield very different results as it should include all types of tasks instead of merely technical expert tasks as was the case in this study.

Figure 11 shows the structure of the Transport Technology Department which consists of the Department Director, three Chief Experts as direct subordinates to the Department Director and two units lead by Heads of Unit and both units including six experts.

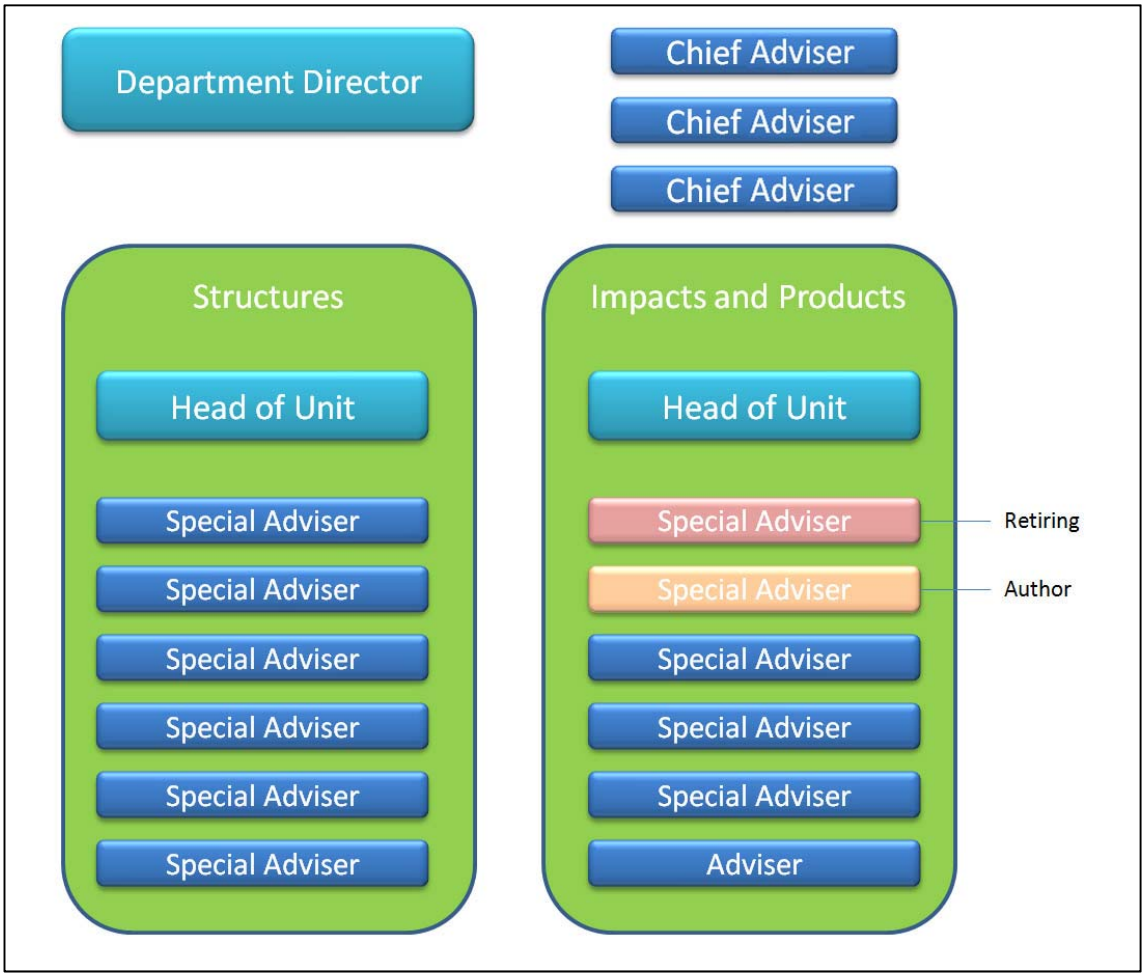


Figure 11. Organizational structure of the Transport Technology Department.

Figure 11 depicts the department's organization, including information on the experts excluded from the audit. In the general audit phase, only the experts were interviewed. The Heads of Unit and the Department Director are to be provided with the analyzed results after the finalization of the Thesis to gain their insight to the findings at the department level.

On the background (demographic) section of the interview, the auditees' title, department and unit, age and years of relevant experience were asked. The department's average age of 49.8 years, despite including some relatively young people as well, is well above Trafi's average of 45.3 years, according to the organization's average demographics presented as Appendix 3 to this Thesis. Additionally, the experience possessed by the experts of the department on average is very extensive when considering the years of relevant work experience. At Trafi, the average is 8 years of govern-

mental service while at the Transport Technology department the average relevant experience is 23.3 years. These two values are not comparable as such due to the difference in the nature of experience; however, they give a good indication of the extent of the auditees' proficiency. A more comparable value can be achieved when considering the auditees' experience in Trafi and the preceding agencies, of which the average is 15.1 years. The differences are visualized in Table 4 below.

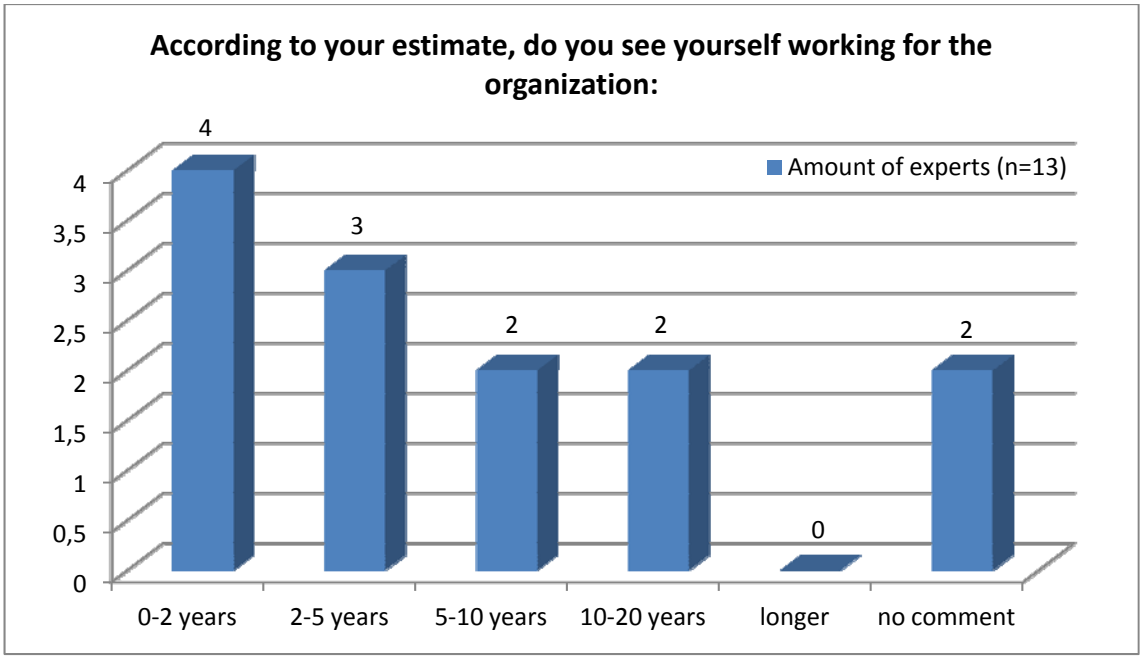
	Trafi avg	"Gap"	Auditees' avg
Age (years)	45,3	**4,5**	49,8
Civil service (years)	8,0	**7,1**	15,1*)

*) includes only civil service at Trafi and the predecessor agencies

Table 4. All Trafi employees' and Transport Technology Department's average age and work experience compared.

The relatively high average age of the experts of the department in question, visible in Table 4, makes the expertise all the more vulnerable and the need for the transfer of their expertise very actual. Of the 13 experts interviewed, 5 were 60 years or older and 7 were 55 years or older.

The auditees were also asked to answer a voluntary question on how long they would see themselves working for the organization. Of the 13 auditees, 11 provided an estimate and two refused to comment, the results being shown in the graph below.



Graph 1. Answers to a voluntary question on the auditees' estimated time left at the organization (n=13).

As is visible from Graph 1, seven experts disclosed that they were considering leaving the organization within the next 5 years. To a great part, these dramatic results are explained by the upcoming retirements; however, it was apparent that other knowledge is also at risk of being lost in the near future. The majority of the experts also stated their dissatisfaction with the justification of the multiple organizational changes in the near past. If generalized, the expert-level view was that the changes had not improved the conditions of doing one's daily work, which consists for most experts of transport safety, environmental safety and vehicle conformity related tasks. The organizational changes were seen as making change for the sake of change rather than improving the safety of transport. The new transport system oriented thinking, described in Section 1 of this Thesis, was seen by the auditees as being understandable for the organization's top structure. The auditees believed, however, that the organization should be allowed to keep the forms of transport "alive" within the organizational structure, when going into more detailed tasks and lower organizational levels.

4.2 Audit Segment Analysis

As stated earlier, the audit consisted of three segments attempting to provide different points of view to the knowledge management and utilization at Trafi. Segment A (n=13) was related to organizational change and the changes related to the expertise of the auditees. Segment B (n=13) consisted of listing the expertise areas and their respective utilization in Trafi. Segment C (n=13) of the audit included questions related to the possible practices of sharing knowledge in the organization as well as improvements to the current methods of knowledge management.

4.2.1 Segment A: Organizational Change and Expertise

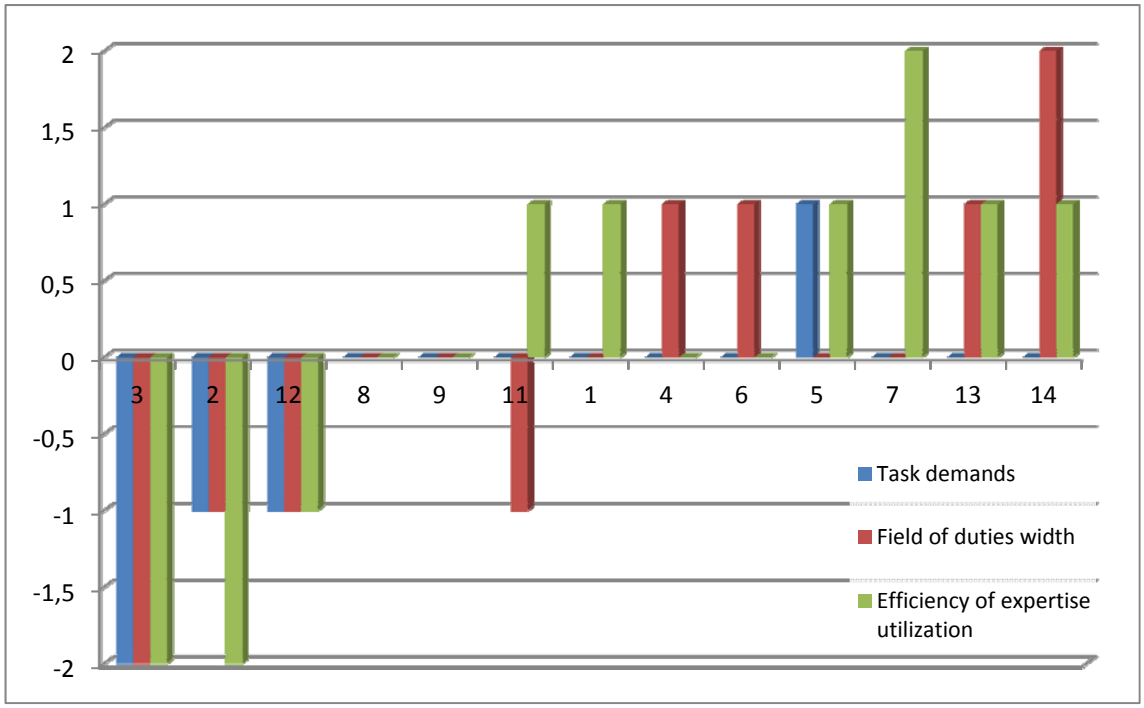
The first segment of the audit consisted of three questions related to the impacts of the most recent organizational change to the demands of the job, duty field width and the efficiency of expertise utilization. The auditees were asked to grade the impact on each category on a 5-point Likert scale described in Table 5 below.

	1	2	3	4	5
1. Task demands	Significantly less demanding	Somewhat less demanding	No change	Somewhat more demanding	Significantly more demanding
	1	2	3	4	5
2. Duty field width	Significantly narrower	Somewhat narrower	No change	Somewhat wider	Significantly wider
	1	2	3	4	5
3. Efficiency of expertise utilization	Significantly less efficient	Somewhat less efficient	No change	Somewhat more efficient	Significantly more efficient

Table 5. Interview Segment A grading on a 1-5 Likert scale.

From the answers to the first segment and the discussions around the subjects, it became apparent that no general trend could be determined. Some experts had the feeling that all or most of the asked areas had suffered a significant negative impact during the organizational change. Other experts, on the other hand, saw that the impact had been positive and their expertise was put to better use since the change.

To illustrate the “negative” and “positive” changes in a more correct way, for the use of the following Graph 2, the scale was transformed from a positive 1 to 5 scale to a 5-point scale ranging from -2 to 2. This change could have been introduced already to the questionnaire; however, the researcher failed to realize this earlier than in the analysis phase. The graph below is organized by the sum of the answers to each question from negative to positive, from left to right.



Graph 2. Experts’ answers to Segment A questions.

As Graph 2 shows, it is apparent that there is no uniform trend among the interviewed experts as for their view of the impact of the organizational change on their duties, tasks and expertise. The ones who felt the impact was mostly negative were among the more experienced employees; however, possessors of similar experience saw the impact also as positive or bringing no change. The same pattern occurred in the positive end of the scale, as the ones seeing the impact as positive were among the less experienced employees, but again similar expert profiles were found in the neutral answers. Therefore, no significant conclusions can be made from the correlation between years of experience and the positive or negative impact of organizational change.

The discussions held during the Segment A audit were more enlightening than mere numbers. In the discussions, it became apparent that most of the interviewed experts had extensive careers behind them, and their preceding tasks had varied from management positions at the governmental sector to world-class expert positions in the private sector. Many of the senior experts had been given the possibility to create their own duties after the organizational change, and that was seen as a positive outcome. Still, many felt that the value given to their work was not at the same level as before.

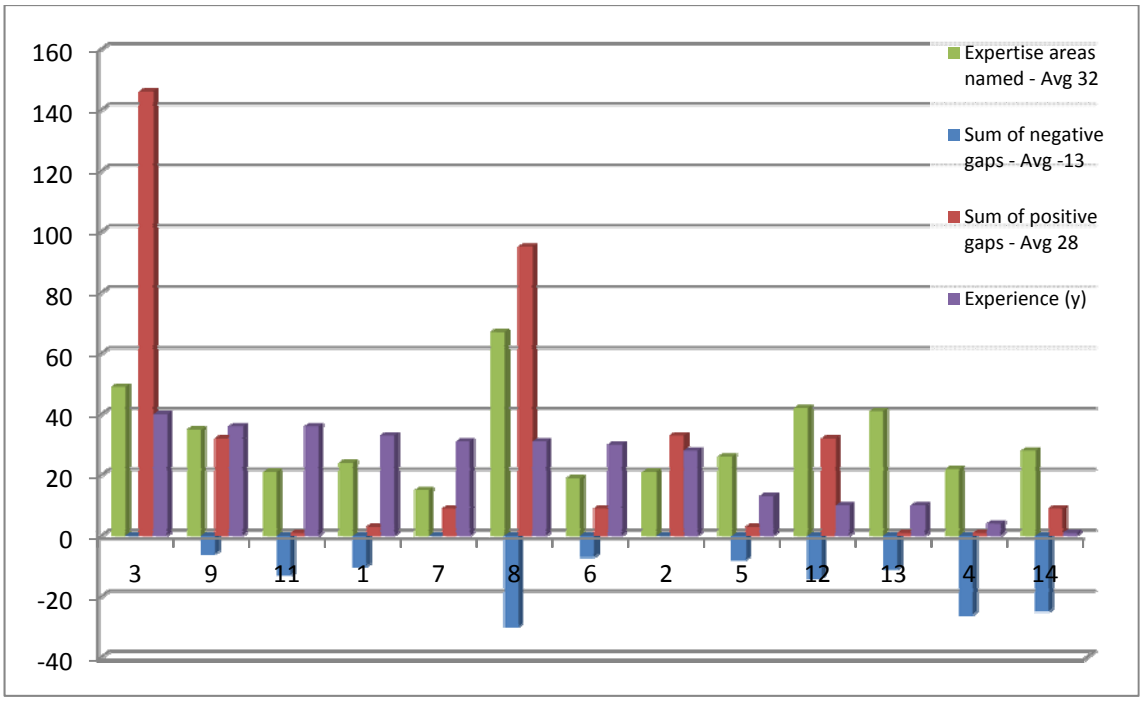
It has to be taken into account that, at the moment, the new organization is still in its first months of existence, and the expert duties will develop in time. This was clearly acknowledged by the auditees as well. The current confusion could, in many auditees' opinion, have been avoided, had the organizational change been planned more comprehensively also on the expert level.

The results from the Segment A audit can be considered a justification for the following proposed practice:

- Evaluating the impact of the organizational change on the expertise at Trafi (organization-wide questionnaire related to this was launched in late March, 2012).

4.2.2 Segment B: Expertise Areas and Expertise Utilization at Trafi

In Segment B, the auditees were requested to list the most significant expertise they possessed, to value the level of expertise on a 1-5 Likert scale and also to grade the utilization of the specific expertise in their current task. The experts were given predefined expertise areas to aid the listing as well as provided an imaginary sample answer based vaguely on the researcher's expertise. The number of areas to be named was not limited in any way and the results showed great variance in the total areas named. The smallest number of areas an expert named was 15 while the biggest was 67. The average of expertise areas named in the department was 31.5; while the total number of areas named was 410 and the sample was 13. The overlapping areas which exist in multiples are naturally considered as part of the average.



Graph 3. Total expertise areas named, the sum of positive expertise gaps (excess) and the sum of negative expertise gaps (scarcity) arranged in order of experience (years).

Graph 3 above shows a visual representation of the answers to Segment B in the total areas named, the sum of negative gaps in expertise (knowledge scarcity or need) and the sum of positive gaps in expertise. The answers are arranged by the experts' years of experience relevant to work at Trafi. As can be noted from the chart, the years of experience (purple columns) have no significant influence on the knowledge areas named (green columns). The positive gaps (red columns) showing excess knowledge are on average greater on the experienced side while the negative gaps (blue columns) are, on average, greater on the inexperienced side. This pattern was expected; however, due to the researcher's choice not to limit the numbers in any way, these results lead to no concrete conclusions.

During the interviews, the discussions arising when going through this segment were very enlightening. Some of the experts, mostly on the less experienced side, saw the current situation in the organization as a positive one and finding several areas for improvement was considered a positive challenge. Some of the more experienced experts, especially the ones naming the greatest excess knowledge gaps, were quite concerned about the retention and utilization of their extensive knowledge by the organization. As all the named areas were gone through in the interview and the areas

with significant gaps (2 or more) discussed further, the room for naming non-existing areas for personal or other reasons was reduced to a minimum. This should be considered if the charting is in some form to be extended to the whole organization in the future, especially if the charting was to be conducted electronically, without an interviewer going through the areas with the auditees, unlike the case in this study.

The 13 auditees named altogether 151 expertise areas where their expertise was not, in their opinion, utilized as efficiently as it could or should have. At the same time, the auditees named a total of 110 expertise areas in need of development. Unfortunately, these do not exclude each other. This should encourage the organization to recognize expertise as asset and take on the task of creating official expertise profiles for each expert, as well as take the necessary actions to follow the development of these profiles.

The results from the second segment of the audit can be considered a justification for the following proposed practices:

- Organizational knowledge mapping should be conducted in order to create a knowledge inventory for the organization.
- Charting excess expertise areas to enable sharing expertise.
- Charting lack of expertise to find targets for sharing expertise.

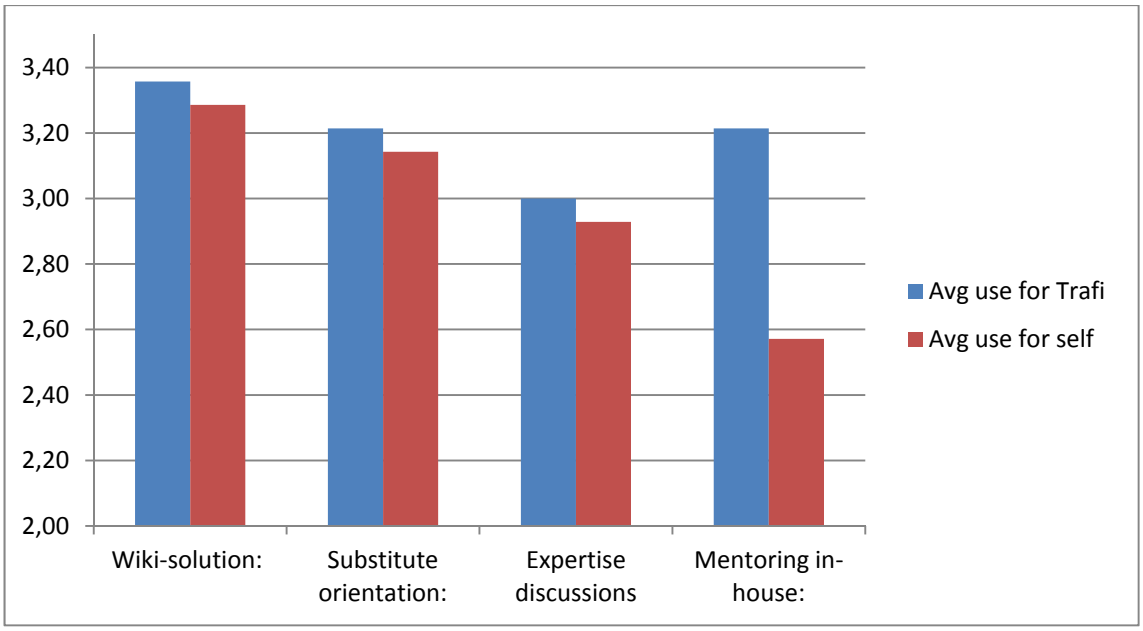
4.2.3 Segment C: Sharing Expertise

In this segment, the auditees were presented with four options for improvement of expertise sharing. The proposed options included the methods discussed previously in Section 2.3 of this Thesis. The questions presented were translated into English. In Table 6, the averages of the department's answers are included in the answer boxes:

12. Estimate the usefulness of the **following methods of sharing expertise** to the organization on a 1-5 scale (1=not useful, 5=very useful). After that, estimate to the following column the usefulness of the method for the purposes of sharing and developing your own expertise (1=not useful, 5= very useful).		
Method of sharing expertise:	Use for Trafi (avg)	Use for self (avg)
Wiki solution: An open expertise and information database, discussion forum, blogs and sharing information	3.36	3.29
Substitute orientation: A substitute assigned to all tasks, who participates in the primary expert's duties (appointments, presentations, meetings)	3.21	3.14
Mentoring in-house: Regular appointments, best practices, also between different departments and sectors	3.00	2.93
Expertise discussions: More detailed development and monitoring of the expertise profiles, the development of primary expert and substitute.	3.21	2.57

Table 6. Knowledge utilization audit question 12 translated into English with the average of the answers included.

In general, all the proposed methods, shown in Table 6, were seen as possible improvements to the current situation in the organization. None of the methods rises clearly above others, and this supports the proposals made later in this Thesis. The methods do not exclude each other; instead, they are likely to reinforce each other if used simultaneously. As displayed in Graph 4, the wiki solution has the highest support among the departments' experts, both for the use for the organization and for the experts themselves.



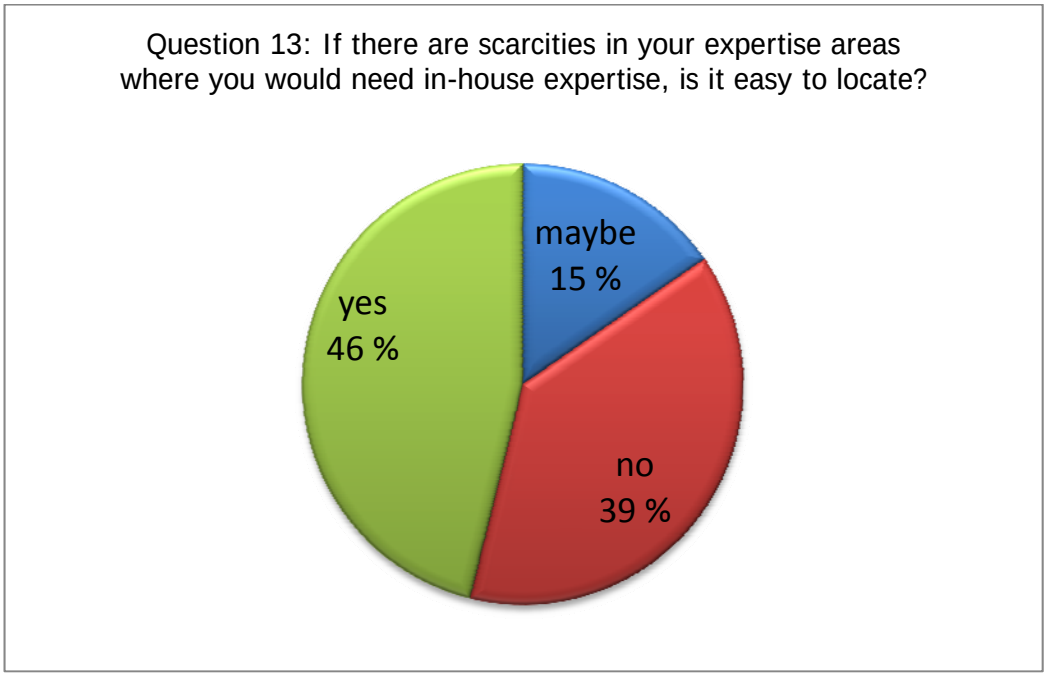
Graph 4. Auditees' average answers to question 12.

The second proposed method shown in Graph 4, substitute orientation, was already taking place for many experts in some form. It was not generally seen viable as a definite substitute system but rather as a work partnership, and in this less strict form, its usefulness had been already proven. The expertise discussions were seen by many experts as an ineffective system what comes to sharing and developing expertise; however, the proposed idea of the discussions' development to a more expertise valuing event was supported. In-house mentoring was seen as a good system for certain situations but, rather than being useful for experts, its usefulness could be even stronger for new people in supervisor positions.

After *question 12* and the evaluation of the usability of expertise sharing methods, the audit continued with the subject of expertise sharing. During the interviews, a significant amount of discussion arose while going through these questions. The main issues from the discussions are included in the analysis in the following pages.

The purpose of *question 13* above was to investigate the need for an expertise locator or some other new electronic expertise-locating solution to be introduced to the organization.

Question 13: If there are scarcities in your expertise areas where you would need in-house expertise, is it easy to locate?

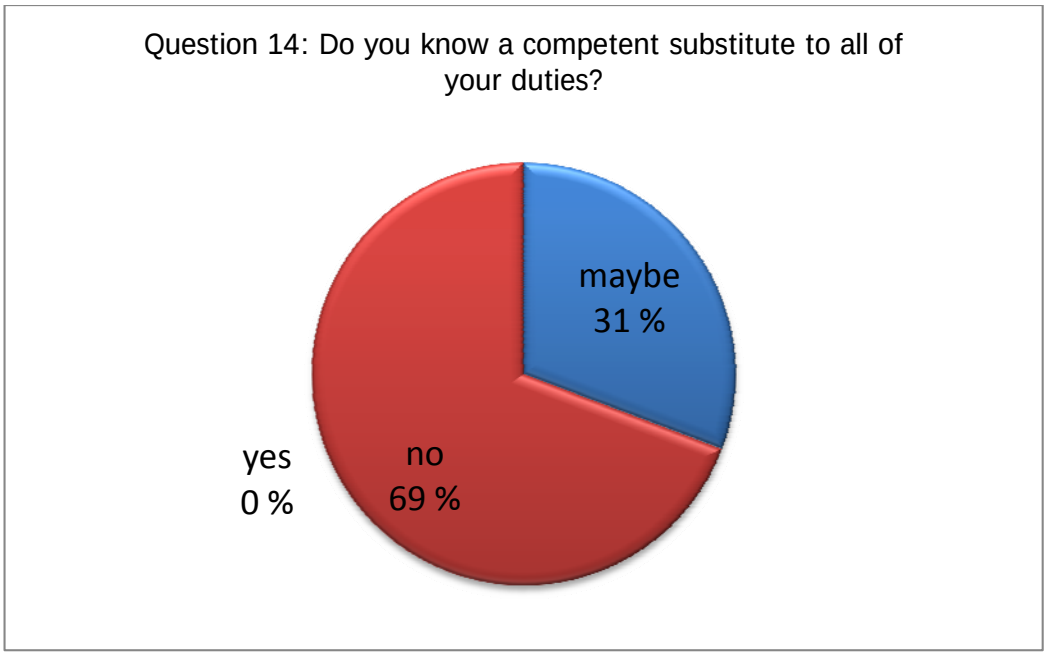


Graph 5. Answers to audit question 13.

The answers to question 13 varied a lot as can be seen from the diagram above. The experts answering “yes” saw that locating in-house expertise was not easy at all. The ones answering “no” were the more experienced experts, whose tasks had not changed much in the organizational change, and they saw that they knew personally all the people they needed to know for in-house expertise. Therefore, it can be determined that the increased visibility of expertise in the form of a wiki solution or a more sophisticated expertise directory would improve this situation.

The aim of *question 14* was to determine how well the department experts’ tasks were covered by substitutes. In defining this, the need for improvement of the substitution system could be justified.

Question 14: Do you know a competent substitute to all of your duties?

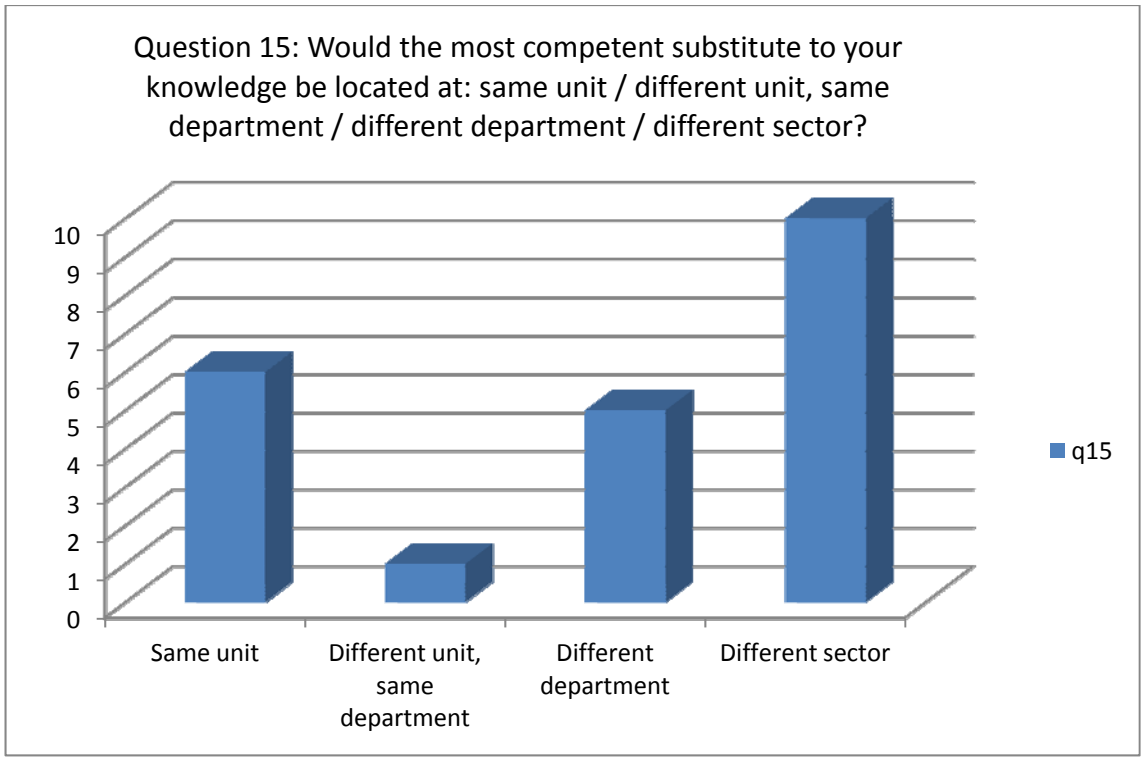


Graph 6. Answers to audit question 14.

The answers to question 14 reveal that none of the experts were totally sure that all their tasks could be conducted by a substitute. Out of the 13 auditees, 9 were of the opinion that their tasks could not be taken up by another person or persons, should they be absent. Four auditees saw that someone could perhaps take their tasks; however, they were not sure either who it would be or whether all the tasks were possible for the substitute. If the situation is similar, should the question be asked from all the organization's employees, the need for improving the substitution system is apparent. These results provide a signal that the situation in the organization needs to be charted which can be done by auditing the organization separately or be included in the yearly development discussions as a separate section.

The auditees were allowed to give multiple answers to reply to *question 15* mainly due to the organizational change, the pre-change close colleagues being in many cases distributed in many separate areas in the new organizational structure.

Question 15: Would the most competent substitute to your knowledge be located at: same unit / different unit, same department / different department / different sector?

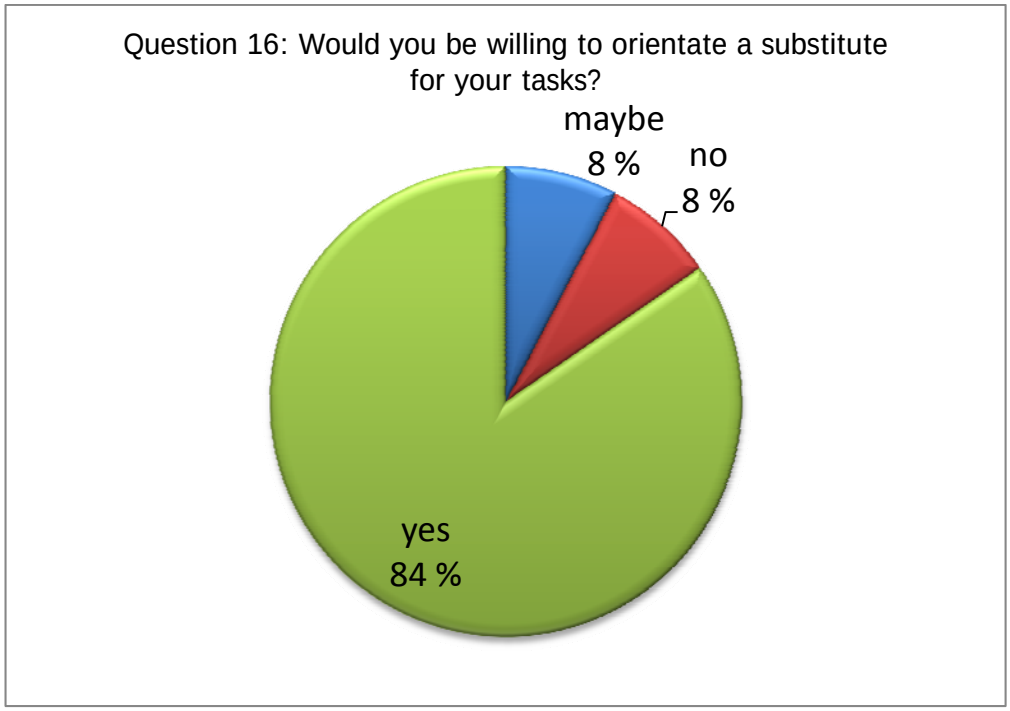


Graph 7. Answers to audit question 15.

The answers to question 15 reveal that in 10 cases the experts see that their most competent substitute is in some other sector of the organization (sector is on the highest level of the organizational structure at Trafi). Five cases were such that the most competent substitute to some tasks is in another department and six cases where the most competent substitute is close by in the same unit. This graph and the discussions during the interviews indicate that the organizational change has resulted in the potential substitutes being scattered around the organization. The proposed substitution system should therefore not be restricted to the closest colleagues in the same unit but should allow experts even in different sectors to work closely together. As the organizational structure has been so significantly altered, the "old" partnerships and substitution practices may be impossible to utilize and new connections must be made. The experts should be consulted in person to find out their unique needs in this issue; nearly all situations are likely to be different.

Question 16 was designed to have an indication of the experts' willingness to take on a project to introduce their duties to a potential substitute. This question was intended to provide justification to improvements of the substitution system at Trafi.

Question 16: Would you be willing to orientate a substitute for your tasks?

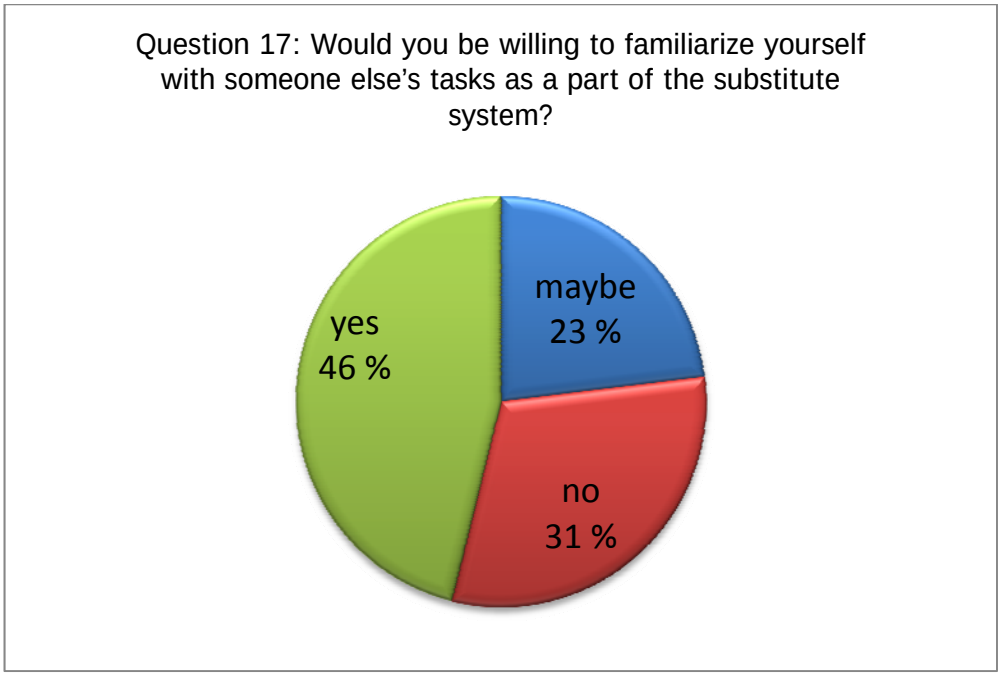


Graph 8. Answers to audit question 16.

As can be seen from Graph 8, the majority of the experts were willing to orientate a substitute for their tasks. However, during the discussions it became apparent that this system should not produce significant amounts of extra work, but should rather be an informal work partnership where the substitute would observe the primary expert's work in meetings, presentations, training situations and other more public activities. Additionally, the partnership would require similar backgrounds and rarely could be reached over the traditional forms of transport. These results and the experts' willingness to participate in these improvements give more leverage to the introduction of an improved substitution system to the organization.

In order for a substitute system to function comprehensively, the experts were asked their willingness to also become familiar with someone else's tasks. *Question 17* was structured to provide the answer to this.

Question 17: Would you be willing to familiarize yourself with someone else's tasks as a part of the substitute system?

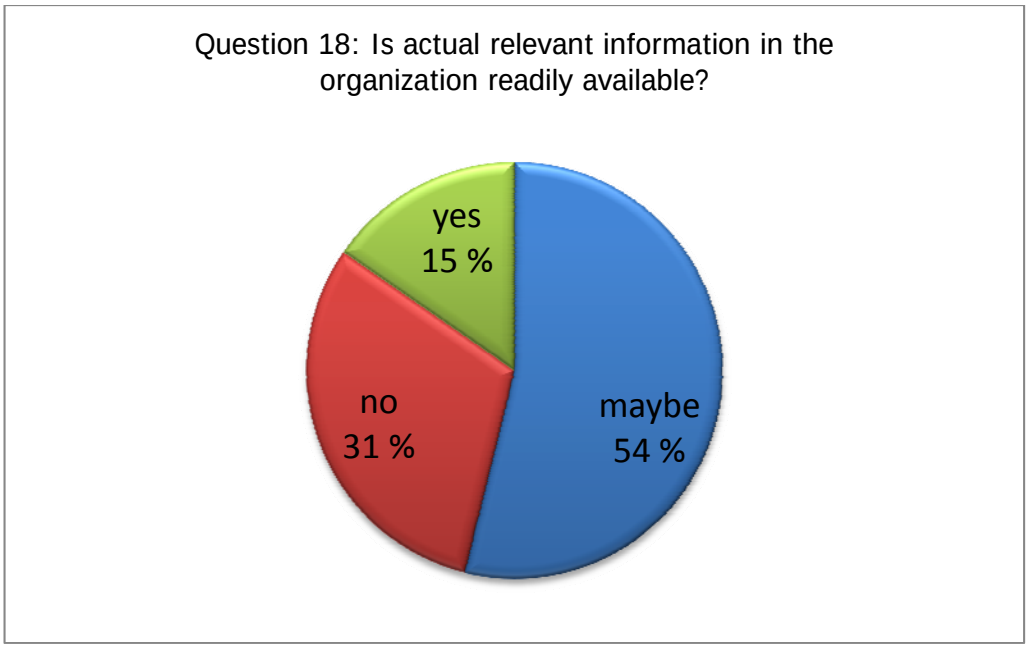


Graph 9. Answers to audit question 17.

Graph 9 demonstrates that nearly half of the 13 experts considered that they would without question be willing to learn someone else's tasks to some extent. The "maybe" answers all had the condition that the tasks have to be closely related to the expert's current tasks, making the familiarization easier and also more useful in relation to one's own tasks. The four experts answering "no" considered that they were so close to retirement that this was not possible or sensible. Still, with the vast majority answering yes or maybe, the willingness among experts to improve the system and learn more exists. The questions 14 to 17 show that the proposed more comprehensive substitution system could prove useful if the partners involved have similar backgrounds.

Question 18 was intended to provide the experts' view to the availability of relevant information in the organization. The aim was to provide justification to the introduction of methods of sharing organizational information as well as expertise in the form of an electronic (wiki) solution.

Question 18: Is actual relevant information in the organization readily available?

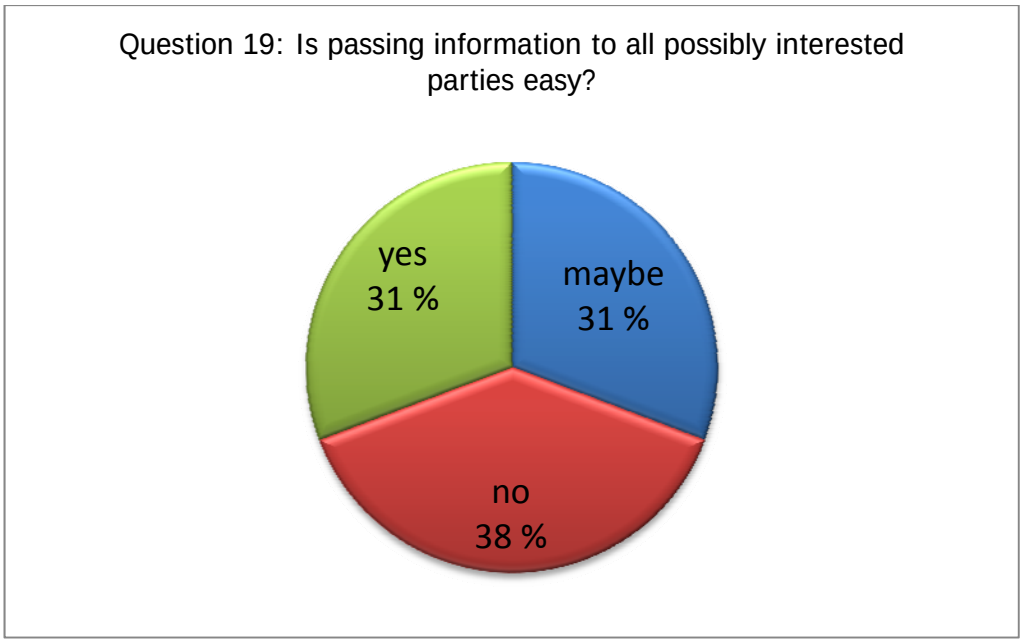


Graph 10. Answers to audit question 18.

As shown in Graph 10, the experts saw that the relevant information was somewhat readily available. However, only two experts of 13 were unconditionally of this opinion. During the discussions, it became apparent that information on e.g. the most recent organizational change and its proceedings had not reached all as was hoped for. Most of the experts, nine answering "yes" or "maybe", saw that the information related to their duties was sufficiently available. The answers and the discussions during the interview revealed that generally the information flow in the organization is not at a level where it should be; however, the situation concerning directly work-related information was better.

Question 19 was designed to provide information on experts' ability to spread information and interesting issues to parties possibly interested in the area of information. The word "possibly" was included to emphasize the fact that for one reason or another, people unknown to the experts may be interested in their field of expertise.

Question 19: Is passing information to all possibly interested parties easy?



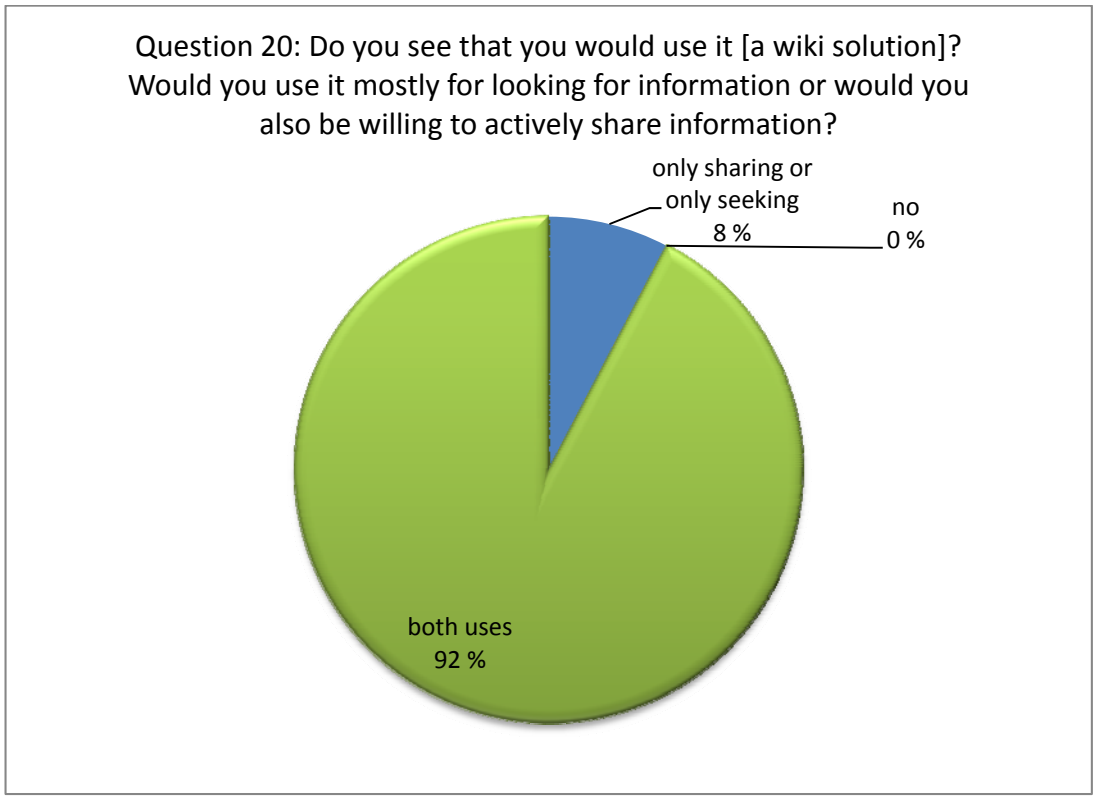
Graph 11. Answers to audit question 19.

As seen from Graph 11, the answers to question 19 were very uniformly distributed between the choices. Only four experts (31%) were unconditionally of the opinion that passing information to all possibly interested parties is easy. Almost all the auditees indicated that their primary method of sharing information was through e-mail and using mailing lists. This gives an indication that the proposed wiki solution, especially if extended beyond an expertise locator, could improve sharing information to those interested parties whom the source does not recognize.

In *questions 20 and 21,* the auditees were asked questions directly related to the possible introduction of an electronic wiki solution to Trafi. The question included an assumption that the solution was already introduced and first part involved the experts' preferences to the use of the solution, and the second part was intended to provide the experts' views on possible problems and upsides coming with this new system.

Questions 20-21: If Trafi introduced a wiki solution where the personnel expertise areas were clearly visible and which would provide a possibility to easily share information, best practices and opinions: Question 20: Do you see that you would use it? Would you use it mostly for looking for information or would you also be willing to actively share information?

Question 21: What upsides and what problems would you see in the wiki solution?



Graph 12. Answers to audit question 20.

Question 20, illustrated in Graph 12, revealed that only one expert indicated was willing to only search for information, not sharing anything. All the other experts were of the opinion that they would use it for both sharing and seeking information. This division of answers speaks volumes in favor of the wiki solution to be introduced; however, the upsides and problems indicated in the following question are important to consider as well. In any case, the experts interviewed provide a clear justification to seriously consider the introduction of a wiki solution to Trafi.

The answers to Question 21 were surprisingly consistent, with the same themes appearing several times. The auditees indicated the following upsides to creating a wiki solution: a) centralized availability of information, b) ease of finding information, c) ease of adding information, and d) usability anywhere, not being restricted to the office.

The following possible problems and downsides coming along with the wiki solution were the most concerning ones to the auditees: 1) relevance and reliability of information in the solution, 2) information overflow, 3) absence of active users, 4) need for administration and moderation, and 5) extra work load for active users.

In the discussions, it became also apparent that the possible wiki solution and the areas of information and data in it need to be well categorized and allow searching information through different search criteria. In general, the ease of use and a low threshold to start using the wiki solution is a key factor in its success. Many of the auditees referred to popular social media sites such as Facebook and Linkedin when explaining how the system should "look like". Therefore, should a wiki solution be ordered from a system provider, the specifications must emphasize the ease of use and especially good categorization of information and well-designed search functions.

Overall, the final segment of the knowledge utilization audit was designed to justify or denounce the proposed practices of sharing expertise selected for this Thesis.

The results from the third segment of the audit can be considered a justification for the following proposed practices:

- Introducing new or improving existing methods of expertise sharing.
- Investigating possible options for introducing a wiki solution to Trafi. Evaluate the whole organization's interest into using this system.
- Allowing or demanding visibility of expertise and language skills in the current personnel directory and making it more an expertise directory than a telephone directory.
- Finding the most vulnerable expert positions which are not backed up and introducing substitutes and work partnerships (substitute candidates found in expertise discussions).
- Extending the work partnership and substitution system to the whole organization (where deemed necessary).

- Investigating possible candidates for mentorship projects. Creating a simplified procedure for starting mentorship projects (internal/external). Also for external mentorship projects, creating ready-made contract templates.
- Developing the expertise discussions further, considering expertise also in the results discussions (twice a year).
- Creating a comprehensive expertise profile for all experts, updated when needed but at least twice per year.

5 Proposed Practices

This section presents a proposal of concrete practices for the case organization to consider in the near future. The proposal is divided according to the suggested practices and indicated the implications of these practices to certain organizational areas. These implications are separated from the text by text boxes. The implications are also gathered together separately and presented in Section 6 of this Thesis.

5.1 General Proposals

The general proposal for the case organization consists of the following steps. The first step the organization should take to provide a basis for sharing and retaining expertise is for the management to take *a strong stand on the value of the expertise possessed by the organization*. It is apparent that the amount of knowledge existing in this expert organization is vast. Therefore, even before measuring the vastness to any detail, the management should recognize this vulnerable resource. In order for the other proposed practices to succeed, the management must be willing to provide the resources needed for charting the organization's expertise in total, the creation of the methods of sharing as well as keeping the cycle going on indefinitely. The organization must also tackle the possibly occurring issue of resistance to knowledge sharing by providing incentives or a rewarding system to experts willing to participate in this actively. The experts and other employees are encouraged to bring forward their expertise areas and consider them even more valuable when visible and available to all interested parties in the organization. The expertise does not disappear from one's repertoire when shared, instead it may well develop further.

Implications:

Top management and HR department:

- Allocate resources and make a plan to map the organization's knowledge and expertise thoroughly.
- Investigate possibilities of rewarding active expertise sharing.

The new organizational structure of Trafi provides not only the urgent need but also challenges for effective knowledge transfer. The challenges may well be contextual or be based on competition (Argote 1999) between departments, units or individuals. These challenges, however, need to be overcome in order to reach the pre-change level of functionality and eventually exceed the level as is the aim.

After the organizational change, the second step can be *to categorize the knowledge possessed by majority of the experts* at Trafi into two segments. Firstly, there is knowledge they possess which is utilized in their daily tasks. Secondly, there is knowledge which the experts possess, but which is not utilized in the experts' daily activities, partly due to the new organizational structure and new tasks.

Implication: *HR department:* - While conducting knowledge and/or expertise mapping, take into account the utilization of experts' expertise. Find the unutilized expertise and attempt to take it into use.

Both of these knowledge segments need to be taken under investigation and their management is to be a part of the semi-annual development discussions. The existing and utilized knowledge should be treated from the knowledge retention point of view; and the unutilized excess knowledge should be approached from the knowledge sharing perspective. The two approaches are not totally separate, but instead closely intertwined. If simplified, knowledge retention requires knowledge sharing, and knowledge sharing ends up in knowledge retention.

5.2 Methods to Improve Sharing, Transfer and Retention of Expertise

The research proposal focuses on four main methods of sharing and transfer of expertise which were selected for the reasons of simplicity, actuality and feasibility, and all aim to improve expertise and knowledge retention. Some of the proposed methods are already in use at some or even all levels in the case organization. However, their further development and continuous improvement could prove beneficial for the organization's level of expertise.

5.2.1 Use of a Wiki Solution as an Expertise Database

Currently, an expert's work in the Transport Technology department consists of not only research on various subjects, but also routine tasks such as writing decisions (judgments, rulings, resolutions etc.). The official data is scanned if needed and stored to the organization's records via TWeb, an electrical database for storing records. This system provides a reliable way of storing the records as is the requirement for a governmental agency. The system, however, is relatively difficult to use and the views towards its use are rather negative in the organization. The possibilities to utilize this as a method for more informal transfer and sharing of knowledge, expertise and best practices are, therefore, questionable.

On the organizational level, a significant amount of effort could be saved if everyone was able to search and easily find document templates, best practices, employee expertise information and other help to overcome repeating daily or weekly tasks more easily. Even more importantly, these pieces of information, if updated and valid, would make a difference in helping a new employee or an employee changing tasks to get into gear in the new position more rapidly.

Implication:
Communications department:
- Investigate possible options for introducing a wiki solution to Trafi. Evaluate the whole organization's interest into using this system.

Should an electronic tool for knowledge and expertise management be taken into use at Trafi, it may in the future develop into a more comprehensive IT tool for management of expertise capital. However, as Otala (2008) states, it may be a very heavy system to operate, requiring a lot of effort especially from the HR department. In the first place, in the researcher's opinion, based on the studied literature and information from the organization, the tool should tackle the primary problem of locating experts and their expertise. The tools for this can be found in the social media category (Otala 2008); the most feasible one being the organization's internal "Yellow Pages" solution which allows development to a wider wiki tool.

At the moment, starting from late March 2012, the Trafi intranet telephone directory has allowed experts to fill in their own duty areas and certain other information and this development is certainly a step into the right direction. The next vital step is to make the expertise even more visible.

Implications:

Communications department:

- Allow or demand also visibility of expertise and language skills in the personnel directory and make it more an expertise directory than a telephone directory. Search functions must work with all the named areas.
- When in connection with media, connect the correct expert to each situation. Keep in mind that the directors are not always the best experts.

The studied organization's experts are currently, for the most part, working in the head office. However, due to the arealization plans, 75 positions altogether will be moved to other cities in Finland. Of these 75 positions, 55 are placed in Rovaniemi and 20 in Lappeenranta. In addition to these, Trafi has offices in 7 locations all around Finland. The wiki tool and its communication methods can bring the experts closer, much like the normal office coffee rooms where the information exchange takes place naturally. As Foray argues in OECD (2000), an information and communication technology (ICT) tool, of which a functioning wiki solution is a prime example, may lessen the undesired influence of distance for the functioning of networks.

5.2.2 Improved Substitution System

As the results of the research show, the substitution system of the organization is a potential target for improvement, and seen by the experts interviewed as a feasible one at that. After the most recent organizational change, the majority of the experts having changed tasks, a need for a more organized substitution system for the experts could prove valuable, as the experts' connections from the previous organizational structures may not exist anymore.

The idea in its simplicity is to name a substitute for each expert at Trafi, enabling the substitute to take part in the primary expert's actions, be at their meetings, trips, pres-

entations, inspections or any other activities. This approach has not, to the researcher's knowledge, been used as a common practice at Trafi, and the results of the interviews confirm this to some extent. Such an organized partnership between experts, however, could be one of the easiest methods to improve the retention of the experts' knowledge, both tacit and explicit.

Implications:

Top management and HR department:

- In the first place find the most vulnerable expert positions which are not backed up and introduce substitutes and work partnerships (substitute candidates found in expertise discussions).
- Extend the work partnership and substitution system to the whole organization (where deemed necessary).

The advantages gained from this work partnership would be highly visible also in the cases of newly recruited experts' orientation period. Orientation naturally takes place already in the organization; although the participation in other experts' tasks is not followed and recorded as comprehensively as it could. The orientation planning of new experts varies a lot across the organization, and the best practices in this important area are not uniformly spread to all functions, departments and units. As stated before, the partnership can be a very informal one as well. In some cases, the partnership theme can be taken some steps further and, the organization's resources allowing, the mentoring system described in the following Section could be taken into use.

5.2.3 Mentoring

According to the researcher's personal experience, mentoring can be a very rewarding way of personal learning, knowledge transfer and exchange and improvement of best practices. The process, if conducted well, requires significant resources from the organization arranging the project, but also commitment from both the mentor and the student. The resources being overlooked at this point, the other obstacle to overcome is the absolute need for confidentiality and trust between the counterparts. Therefore, the selection process of matching mentors and students may not be done lightly. The researcher's experiences are based on an extra-organizational mentorship contract

where the mentor was a retired long-time manager from a different governmental organization. The mentorship program was planned to tackle issues related to substance work on market surveillance as well as issues arising in the leadership role the researcher had then newly assumed. The mentor was selected based on his wide experience of similar market surveillance management duties as well as his long history as a manager and a leader. The effort put in the selection definitely paid off, since after all the meetings the researcher felt that something new and useful had been acquired. The present practices were challenged by the senior expert and changed accordingly, or sometimes lead to totally new solutions.

Implication:

HR department:

- Investigate possible candidates for mentorship projects. Create a simplified procedure for starting mentorship projects (internal/external). Additionally, for external mentors, create ready-made contract papers.

This idea being backed up strongly during the interviews conducted for this study, the mentoring process may still be considered somewhat unsuitable for expert work. Instead, this way of learning and sharing knowledge can be considered a good option for people in management and leadership positions on all levels of organizational hierarchy.

5.2.4 Expertise Discussions

An additional platform for improvement in knowledge management can be provided by the annual expertise discussions and results discussions in Trafi. Currently, these meetings with the supervisors are often seen as a negative mandatory task which both the involved parties want to get over with as soon as possible. The format of these discussions, however, could be developed to a more interactive situation where the experts' expertise profile is initially created, then reviewed and updated. New development areas as well as knowledge and expertise sharing issues could be added for reviewing in the next discussion. Another possible adjustment to the expertise discussions to be considered is making them semi-annual instead of having them only once per year.

Presently, there is also another discussion type already in existence, a results discussion, but the expertise and knowledge areas are not considered there. A viable solution could be to introduce, at least, some of the renewed expertise discussions' contents to the springtime discussions as well, in order to keep the expertise at the top of the development areas. Additionally, as described in Section 3.4, the discussion should be aimed at guiding the experts towards the organization's goals, instead of merely the goals of their own area of expertise. The organization can then set a goal of sharing expertise, and the annual or semi-annual expertise discussion can become a forum to promote that goal.

Implications:

Top management, HR department, all supervisors:

- Develop the expertise discussions, consider expertise also in the results discussions (twice a year).
- Create a comprehensive expertise profile for all experts, updated when needed but at least twice per year.

Developing this already existing system further, into a direction where the discussions are even more expertise sharing oriented, is not very stressful on the limited resources of the organization, as may be the case with some of the previously proposed practices. The first step in this direction would be conducting a knowledge audit in the whole organization, which would result in the creation of expertise profiles, which could be then reviewed twice per year. The knowledge utilization audit form used in this study could be used as a basis for creating the expertise profiles. Such discussions would also provide a platform for follow-up on the employee's development in reference to the substitute system, as well as the completed goals reviewed and the new goals set for the following year.

When an expert is willing to put all the expertise possessed on display for the whole organization to see, its effective utilization is much likely to occur in the organization. In the best case, the expert makes visible also the areas of expertise in need of development, and this allows for other experts' excess expertise to be shared and connected to the correct audience. If the organization, then, provides the tools for the expertise to be shared – be it in the form of a wiki solution, substitution system and work part-

nership or mentoring – the methods can be discussed with the experts during the expertise discussions and the best ones selected.

Implications:

Experts and other employees:

- Value your own expertise and be proud of it. Share the expertise, whether it is unutilized or not; this will end up in new knowledge and expertise being created and your expertise retained in the organization.
- Demand means of leveraging your expertise and knowledge and, when provided with the means, use them.

Due to the direction of this study and repeated talks with the Communications department, the researcher was invited to participate in the work of Trafi's network service team. The researcher's aim is to use this forum to further introduce the results of this study to the organization.

Overall, the recommendations provided here are not initially very complex; however, all of the suggested actions are such that they leave room for possible further development in the future. The most important lesson learned when conducting this research is that the organization needs to appoint concrete and visible resources to tackle the knowledge management issues more comprehensively. Knowledge and expertise are the primary resources of an expert organization and these resources should be nurtured and developed as a default.

6 Discussion and Conclusions

This section summarizes and evaluates the results of the study and suggests a set of recommendations for the management, particular departments and experts of the case organization.

6.1 Recommendations

The following recommendations and managerial implications have surfaced in the course of this study. In the following list, the proposals and implications are divided among the recipients in the organization; notable, however, is that all of the following require top management support.

Top Management:

1. Take a strong stand on the value of the expertise possessed by the organization. Although the amount of knowledge existing in this expert organization is vast, even before measuring the vastness to any detail, the management should recognize how this vulnerable resource is.

2. Provide the resources needed for charting the organization's expertise in total, as well as creating the methods of sharing, retaining and eventually developing the expertise, and keeping this cycle going on indefinitely. Consider the possibilities of rewarding active sharing of expertise.

HR Department:

3. While conducting a thorough knowledge and/or expertise mapping, take into account the utilization of experts' expertise. Find unutilized expertise and attempt to take it into use.
4. Create a comprehensive expertise profile for all experts, updated when needed but at least twice per year.
5. Investigate possible candidates for mentorship projects. Create a simplified procedure for starting mentorship projects (internal/external). Also for external mentors, create ready-made contract papers.

6. Develop the expertise discussions, consider expertise also in the results discussions (twice a year).
7. Find the most vulnerable expert positions which are not backed up and introduce substitutes and work partnerships (substitute candidates found in expertise discussions). Extend the work partnership and substitution system to the whole organization (where deemed necessary).

Communications Department:

8. Investigate possible options for introducing a wiki solution to Trafi. Evaluate the whole organization's interest into using this system.
9. Allow or demand visibility of expertise and language skills in the personnel directory and make it more an expertise directory than a telephone directory. Search functions must work within all the named areas.
10. When in connection with media, connect the correct expert to each situation. Keep in mind that the directors are not always the best experts.

Experts and other employees:

11. Value your own expertise and be proud of it. Share the expertise, whether it is unutilized or not, this will end up in new knowledge and expertise being created and your expertise to be retained in the organization.
12. Demand means of leveraging your expertise and knowledge and, when provided with the means, use them.

6.2 Evaluation

During the course of this study, a lot was learned about the expertise and knowledge possessed by a certain department of the organization. There is no doubt that the organization includes several similar departments and units which could benefit from applying the methods used to chart the expertise and the practices proposed by this Thesis.

The study in its actuality, taking into account the very recent major organizational change, can be considered a mildly controversial one. Due to those reasons an evaluation of the results and consideration of the reliability and validity is important. The re-

searcher wishes to emphasize his recognition of the limitations as well as his position in the new organization which may be viewed as a source of bias in the study. This being realized, the researcher has taken special precautions to exclude any personal views from the research process.

6.2.1 Results vs. Research Objective and Research Question

As stated in Section 1 of this Thesis, the objective of this study was to make the expertise and knowledge in the organization transparent and available throughout the organization. The research conducted and the results obtained provide some practices to reach this objective and, more importantly, suggest a glimpse into the current situation in a certain department of the organization. The situation may well represent the organization in general or it may not, in any case, this is something worth trying to discover in further investigations.

The research question for this study set in Section 1 was: *How to share and retain the existing expertise in an expert organization in conditions of a major organizational reform?* The results of the research, with the limitations taken into consideration, provide answers to this question in form of recommendations and practices to introduce to the organization. The answers or proposed practices in this Thesis can be considered directly applicable to the case organization; however, the real-life situation of the whole organization is not taken into account in the data collection for this study. The intra-organizational practices proposed should be validated after conducting a similar study on the organizational scale. The impacts of the most recent organizational reform, as well as the governmental function of the organization, were taken into account in the formulation of the research outcomes.

6.2.2 Reliability and Validity in This Study

The reliability and validity concerns described initially in Section 2.4 were considered during the course of the study. The reliability and validity issues were more informally covered in the construction of the study, in the definition of the research problem and question through the data collection to the analysis of the results.

As described in Section 2.4, Yin (2009) presents four design tests of reliability and validity and the related case study tactics. These areas were considered in this study as follows:

- Construct validity was covered by using multiple sources of evidence, in this case interviews, questionnaire data and internal documents of the organization.
- Internal validity in this study is ensured by structuring the interviews based on literature and presenting the structural issues during the interview to the interviewees as well as asking for their feedback after the interviews.
- External validity is more difficult to achieve in a single-case study (Yin 2009); the external validity of this case can be proved if the research in a similar form is extended to other departments or even the whole organization.
- Reliability of the study is considered to be taken into account sufficiently as a case study database was developed for the interview data. Additionally, all the interviewees were from the same department, doing similar tasks and the interview format was designed to suit the needs of this very department.

Additionally, to ensure internal validity, the interviews in this study, although structured for most segments, also left room for open-ended discussion, which is expected to prove an important data source. Immediately after the interviews, the data from the open-ended discussion, which was written down during the interviews in a notebook, were transcribed into the interview form. The form with all the questionnaire-type answers as well as the open-ended notes was then e-mailed to the respective interviewee for possible comments or corrections.

The open-ended parts of the interview, as planned following Silverman (1985) in Section 2.4, allowed for the auditees to express themselves freely related to the subject of this study and took into account the potential unsuitability of a totally structured interview to all auditees. The auditees were also given the opportunity to bring forward the issues not included in the structured parts of the interview.

However, in this study, the notes from the open-ended discussion were written down if they were related to the broad subject area of sharing, utilization and retention of knowledge and expertise. The issues discussed ranged from general criticism towards

the organization to general praise and included everything in between. Even though the discussion included other issues, only the issues related to the study were transcribed. This also speaks in favor of the validity of the research conducted.

Finally, the phases of research presented in Table 3 of this Thesis, as described by Alasuutari (1993), were apparent also in the data collection which combined a questionnaire-type interview with a more qualitative aspect. The questionnaire type answers yielded some interpretations based on statistical connections and calculating averages, while the qualitative part was more connected to the theoretical framework (conceptual framework in this study), as well as determined the overall direction of the research process.

7 Summary

The objective of this study was to find methods to share and retain the expertise and knowledge that the experts of the case organization possess. The means to achieve this goal are by making the expertise and knowledge in the organization transparent and available throughout the organization.

After the aim of the study and the research question were determined, the related literature along with the initial data obtained from the organization was studied to create the conceptual framework for the study. The qualitative data collection was limited to the Transport technology department of the organization only, as it was considered a good example of an all-expert organizational segment. In the data collection phase, a knowledge utilization audit was conducted in the experts of the department, including some questionnaire-type segments as well as semi-structured interviews containing a limited number of open-ended questions.

The literature reviewed and the data collected were analysed along with the selected best practices. The analysis resulted in a set of recommendations presented in Section 6 of this Thesis to be taken into account by the relevant parties of the case organization.

The study can be considered an actual one, with the new organizational structure being only five months old at the time of writing this. During the study, there have been improvements in areas covered in this study; however, in order to fully cover the expertise possessed by the organization and to take the needed steps to keep continuously improving, further actions are needed. These actions may include some or all the recommendations of this Thesis or merely their partial application.

The most significant decision to make at these critical times is making the expertise of the organization one of the top priorities when considering organizational strategy. For an expert organization this resource is invaluable. This Thesis provides tools for better utilization of this resource in the form of methods to improve the sharing and transfer of knowledge and expertise. Should these methods be taken into use effectively, the organization's expertise is most likely to grow indefinitely.

References

Ackerman, M.S., Pipek, V., and Wulf, V. (2003). *Sharing Expertise: Beyond Knowledge Management.* The MIT Press.

Ahmed, P.K., Kok, L.K., and Loh, A.Y.E. (2002). *Learning Through Knowledge Management.* 1st Edition. Butterworth-Heinemann.

Alasuutari, P. (1993). *Laadullinen tutkimus.* 3rd Edition. Vastapaino, Tampere.

Argote, L. (1999). *Organizational Learning: Creating, Retaining and Transferring Knowledge*. 1st Edition. Kluwer Academic Publishers.

Boughzala, I. and Ermine, J-L. (2006). *Trends in Enterprise Knowledge Management*. ISTE Ltd, United Kingdom.

BusinessDictionary.com (2012). [www document] http://www.businessdictionary.com/definition/expertise.html (Accessed 9 April, 2012).

Dierkes, M., Berthoin Antal, A., Child, J., and Nonaka, I. (2001). *Handbook of Organizational Learning and Knowledge.* 1st Edition. Oxford University Press, USA.

Henriksson, J. and Mikkonen, T. (2008). Wiki-kokemuksia suomalaisissa organisaatioissa [www document] http://tampub.uta.fi/tup/978-951-44-7377-7.pdf (accessed Jan 25, 2012).

Huotari, M-L. and Lehto, A. (2009). *Johtamishaasteena muutos: Kirjasto akateemisessa yhteisössä.* Tampere University Press, Finland.

Kotter, J. (2011). Change Management vs. Change Leadership -- What's the Difference? [www document] http://www.forbes.com/sites/johnkotter/2011/07/12/change-management-vs-change-leadership-whats-the-difference/ (Accessed March 31, 2012)

Lampinen, R. and Ojajärvi, M. (2009). Transport Administration Reform: Agency Merger Report. *Publications of the Ministry of Transport and Communications* 15/2009.

Liebowitz, J., Rubenstein-Montano, B., McCaw, D., Buchwalter, J., and Browning, C. (2000). The Knowledge Audit. *Knowledge and Process Management.* Vol. 7 (1).

Liikenteen turvallisuusvirasto (2011). Toimintakertomus vuodelta 2010 [www document] http://www.trafi.fi/filebank/a/1315916651/b536933635e360d23255a495315fb14a/159-Toimintakertomus_vuodelta_2010.pdf (accessed Jan 21, 2012).

Organization for Economic Co-operation and Development (OECD) (2000). Knowledge Management in the Learning Society. *Centre for Educational Research and Innovation.* OECD Publications.

Otala, L. (2008). *Osaamispääoman johtamisesta kilpailuetu*. WSOYpro, Helsinki.

Paton, R.A. and McCalman, J. (2008). *Change Management. A Guide to Effective Implementation*. SAGE Publications, Inc., USA.

Riksrevisionen (Swedish National Audit Office) (2010). Från många till en – sammanslagningar av myndigheter [www document]. http://www.riksrevisionen.se/PageFiles/1920/RiR_2010_3.pdf, Riksdagstryckeriet, Stockholm 2010.

Riksrevisionen (Swedish National Audit Office) (2011). Summary: The Productivity of the Swedish Transport Administrations [www document]. http://www.riksrevisionen.se/PageFiles/13892/Summary%20RiR%202011_7.pdf, Riksdagstryckeriet, Stockholm 2011.

Serrat, O. (2008). Auditing Knowledge [www document] http://www.adb.org/Documents/Information/Knowledge-Solutions/Auditing-Knowledge.pdf *Knowledge Solutions,* October 2008, Asian Development Bank (accessed Jan 6, 2012)

Silverman, D. (1985). *Qualitative Methodology and Sociology*. Gower Publishing Company Limited, England.

Sullivan, R. (2000). Entrepreneurial Learning and Mentoring. *Journal of Entrepreneurial Behaviour & Research*. Vol. 6 (3).

Szulanski, G. (1996). Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm. *Strategic Management Journal.* Vol. 17.

Tandukar, D. (2005). Knowledge Mapping. [www document] http://ezinearticles.com/?Knowledge-Mapping&id=9077 (Accessed Jan 2, 2012).

Tirronen, L. (2010). Hiljaista tietoa etsimässä. Verkostoanalyyttinen tapaustutkimus sosiaalisten verkostojen vaikutuksesta hiljaisen tiedon jakamiseen julkisen hallinnon asiantuntijaorganisaatiossa. Pro Gradu, University of Helsinki

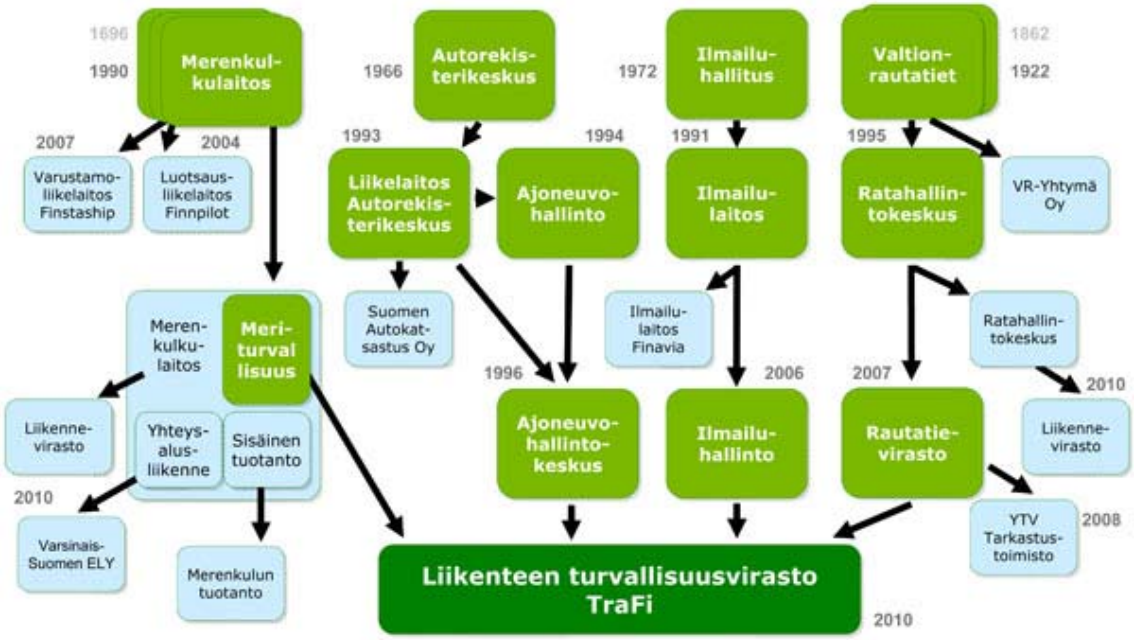
TRAINMOR-KNOWMORE Partners (2005-2008). TRAINMOR-KNOWMORE project. [www document] http://www.trainmor-knowmore.eu/ (Accessed January – March 2012).

Webster's Revised Unabridged Dictionary (1913). [www document] http://www.encyclo.co.uk/webster/K/17 (Accessed 9 April, 2012)

Yin, R.K. (2009). *Case Study Research: Design and Methods*. SAGE Publications, Inc., USA.

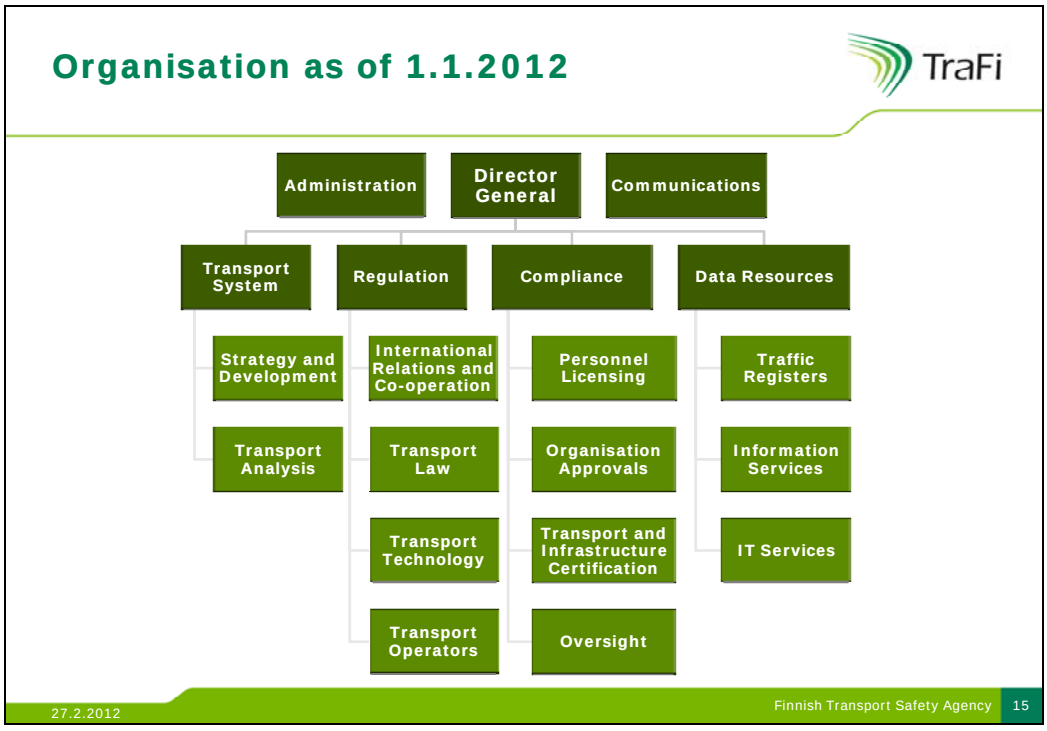
Appendix 1.

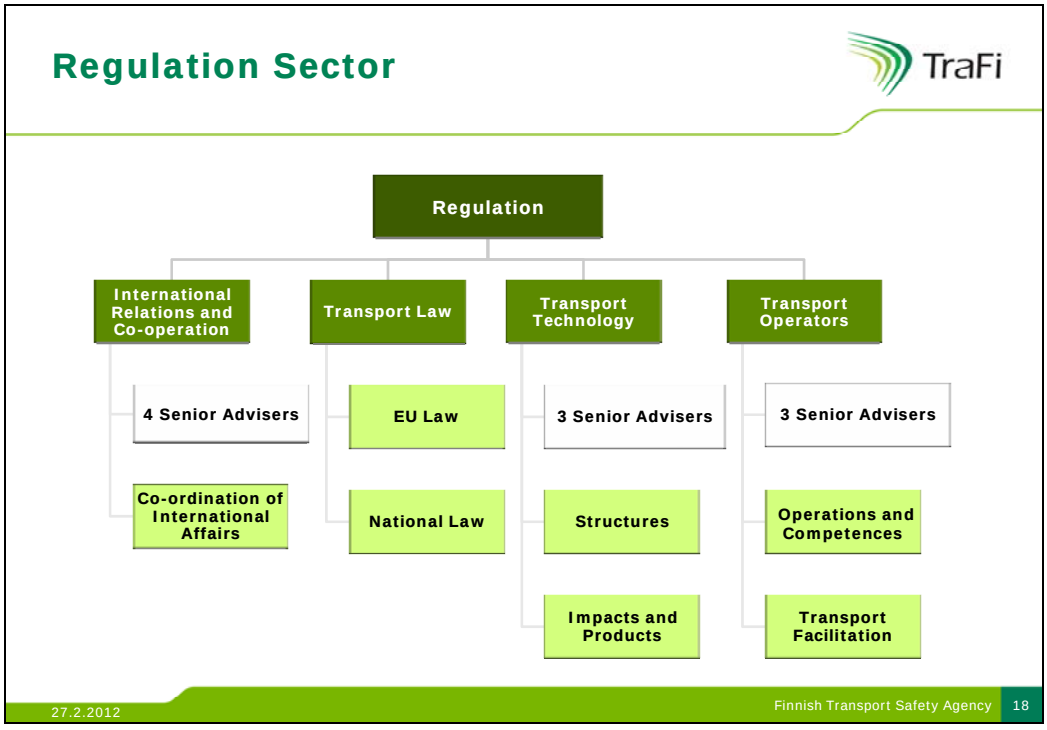
History of the Finnish Transport Safety Agency and the Organizations Involved



The history of the organizations behind Trafi dates back all the way to the 17th century. http://www.trafi.fi/tietoa_trafista/historia

Trafi and Regulation Sector Organization Charts





Duties of the Units at Transport Technology Department

Summary of the presentation of the Impacts and Products Unit

TraFi

PURPOSE (in brief)	• Regulation of environmental impacts of different forms of transport/traffic • •
MAIN DUTIES (in brief)	• Strategically correctly directed and timed action • Bringing forward Finland's needs, points of view and special characteristics in national as well as international fora • Creating international and national contacts to experts and networking with key actors in the field • Participation in preparation of national regulation (legislation) • Expert support to MINTC and other ministries and authorities
INTERNAL STRUCTURE	• Head of Unit • 6 Advisers / Special Advisers
ROLES AND LOCATION (Helsinki/Lappeenranta) Title, FTE and knowledge requirement in brief	• Special Adviser, 1 fte, Regulation related to emissions trading, Helsinki • Special Adviser, 1 fte, Regulation related to noise emissions, Helsinki • Special Adviser, 1 fte, Regulation related to traffic (exhaust) emissions, Helsinki • Special Adviser, 1 fte, Regulation related to transport of dangerous substances, Helsinki • Special Adviser, 1 fte, Regulation related to (recreational) boating, Helsinki • Special Adviser, 1 fte, Regulation related to oversize land transport, Helsinki

Liikenteen turvallisuusvirasto

Summary of the presentation of the Structures Unit

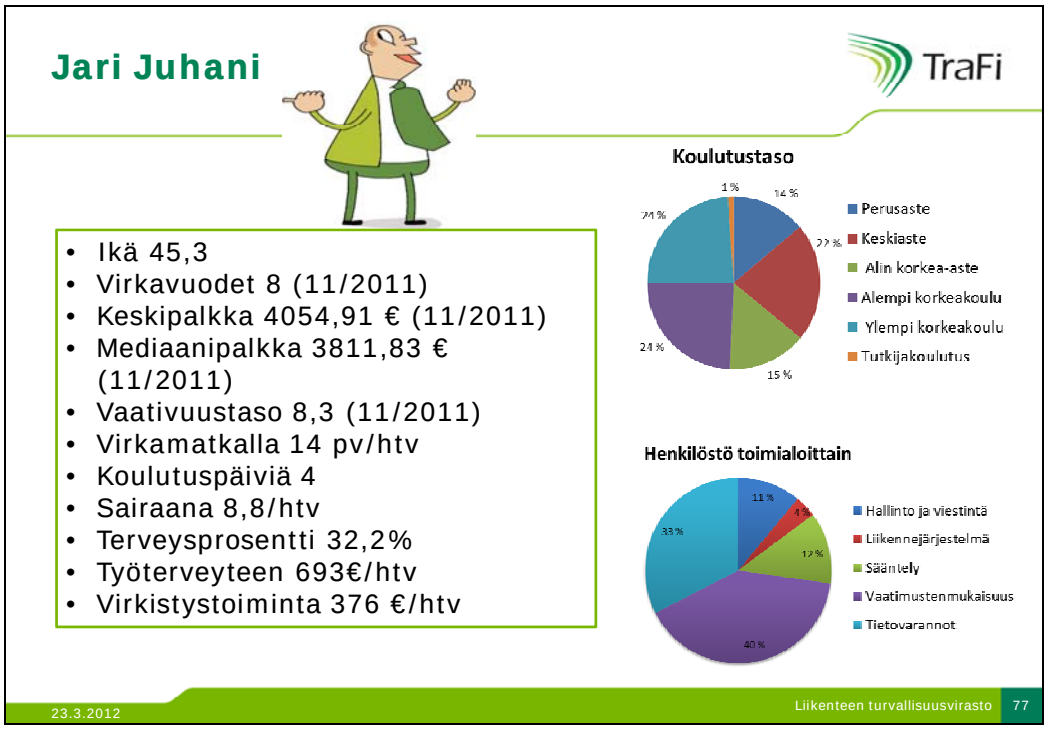
TraFi

PURPOSE (in brief)	• Regulation of vehicles and infrastructure of the different forms of transport • •
MAIN DUTIES (in brief)	• Strategically correctly directed and timed action • Bringing forward Finland's needs, points of view and special characteristics in national as well as international fora • Creating international and national contacts to experts and networking with key actors in the field • Participation in preparation of national regulation (legislation) • Expert support to MINTC and other ministries and authorities
INTERNAL STRUCTURE	• Head of Unit • 8 Advisers / Special Advisers
ROLES AND LOCATION (Helsinki/Lappeenranta) Title, FTE and knowledge requirement in brief	• Special Adviser, 4 fte, Regulation related to railroad equipment and infrastructure, Helsinki • Special Adviser, 1 fte, Regulation related to aviation maintenance and inspection activities, Helsinki • Special Adviser, 1 fte, Regulation related to vessels' structure, Helsinki • Special Adviser, 2 fte, Regulation related to road vehicles, Helsinki

Liikenteen turvallisuusvirasto

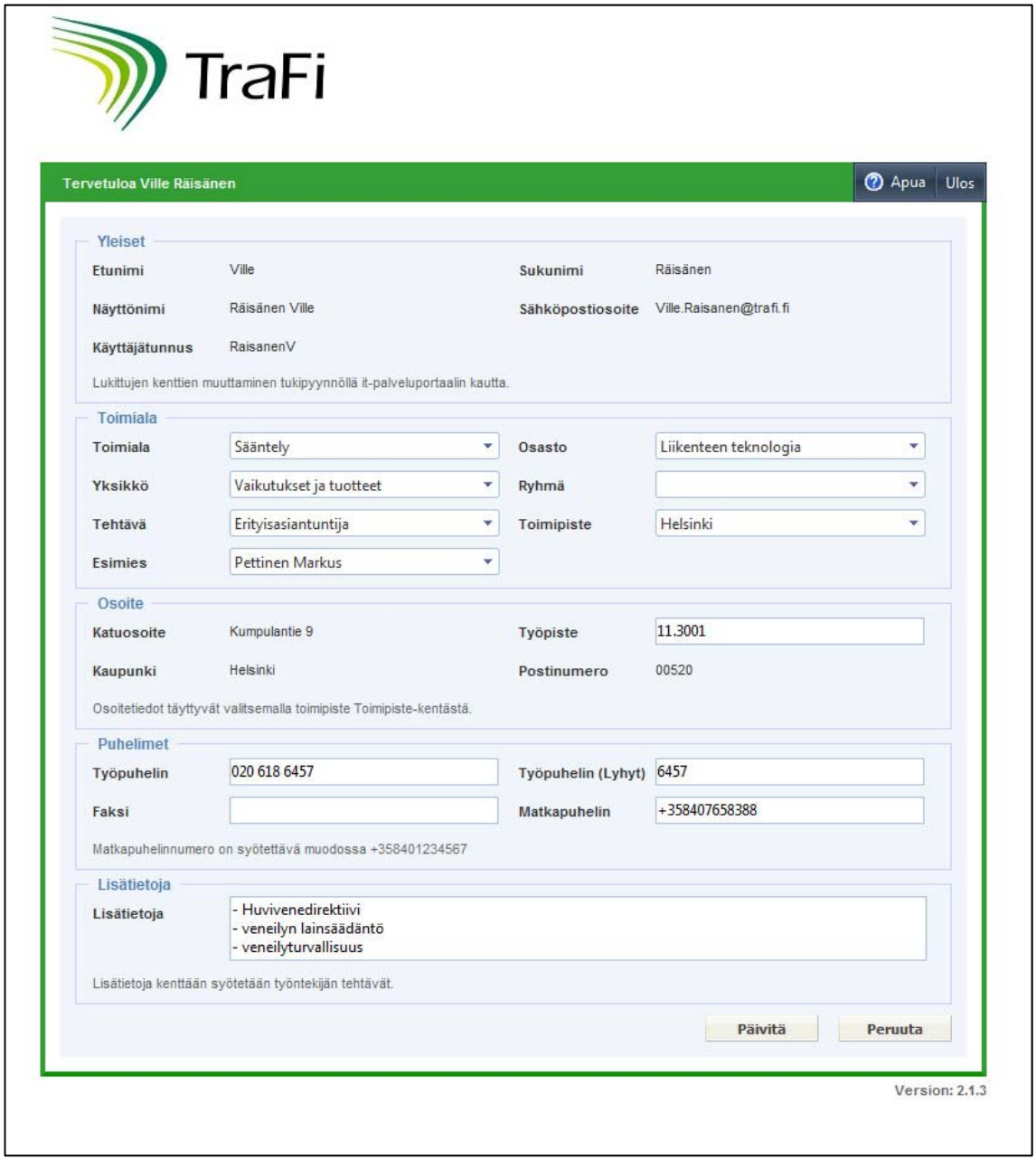
The purposes, duties, structures and employee roles of the two units within the Transport Technology department were presented during the restructuring of the organization in late 2010.

A profile of the average employee of the Finnish Transport Safety Agency



The average Trafi employee profile was presented in late 2010 as a part of the presentations related to the most recent organizational change.

Trafi's new telephone directory profile editing page



In early April 2012, the organization's telephone directory was renewed to allow employees to fill in certain information on their own. Especially relevant taking into account the focus of this Thesis was the possibility to add one's tasks to the profile. The next proposed step would be the possibility to add one's expertise areas in a similar manner.

Master's Thesis project plan for Trafi

Project plan – Expertise mapping and transfer of expertise

This project forms the subject for a Master's Thesis (Metropolia University of Applied Sciences) for Ville Räisänen, Special Adviser at the Transport Technology department's Impacts and Products unit.

The aim of the project is to create a system which allows the Finnish Transport Safety Agency (Trafi) to map the level of expertise and when needed, ensure the transfer of expertise. The study is very actual due to the most recent organizational change, in which the agency's experts' tasks have for a great part changed. In addition, on supervisor levels (especially on Head of Unit and Department Director levels) there is ambiguity on the subordinates' special expertise areas.

In the first phase of the project the mapping and investigation is conducted at Trafi's Regulation Sector's Transport Technology department as a "pilot project". After this, same methods can be applied to the whole organization, one department or unit at a time, as needed.

The proposed practices of transfer of expertise can be utilized in the future also in isolated cases; for example when an employee retires, resigns or when recruiting new experts.

Execution

Defining desired state

The first phase of the project consists of defining the desired state at the Transport Technology department. This investigation includes going through the statutory and other relevant tasks which are in the department's jurisdiction, based on which the minimum requirements for the department's experts' expertise can be defined. The expertise audit of the next phase will be compared to these minimum requirements to find possible gaps in expertise and knowledge.

In addition, a supervisor level audit related to the supervisors' awareness of the units' and experts' expertise, duties and division of tasks will be conducted.

Expertise Audit

The expertise audit is conducted especially among experts and the aim is to objectively determine the experts' expertise levels on various areas, based on the experts' own experience. In addition to expertise related to the duties of the department, it is highly likely that such expertise will surface, which is outside the functions of Transport Technology department and which would be useful to transfer to experts in other departments.

The audit is conducted as personal interviews, in which it is attempted to define the nature and extent of the expert's expertise related to the statutory tasks as comprehensively as possible. In the interview, also other expertise, possibly useful in other areas of the organization, is requested to be revealed.

On supervisor level, their awareness of the department's and unit's tasks and the correlation to the experts' expertise is charted. If there are gaps in the supervisors' awareness, the person responsible for that expertise area is determined. It must be taken into account that on supervisor level the expertise in substance issues does not have to be on the same level as for the experts.

Tracking down gaps in expertise

When the desired state and the available expertise have been defined, these two can be compared and therefore possible gaps in expertise related to the department's duties found. The gaps are compared to the pre-change organizational structure and the current residence in the organization of the missing expertise is revealed. In the methods and practices proposed further on, the attempt is made to transfer the expertise from its current holders to the ones who need it in the Transport Technology department. If the experts having possessed the needed expertise have left the organization or for some other reason the expertise is not available within the organization, a training program is created for the expert, who has the responsibility of the relevant task in the new organization.

Transfer of expertise

In the last phase of the project, a practice (or practices) for transfer of expertise and knowledge is created, which can be utilized after the "pilot phase" in all units of Trafi where the need arises. The practices are selected according to the nature of expertise and the organizational structure, based on studies and literature in the field.

The expertise audit should most likely be conducted in all the departments of Trafi in the near future, possibly as a part of the upcoming expertise and development discussions. All the gathered information should be combined to a Trafi knowledge map and the map should be published on Trafi's intranet site for all the employees to utilize. This would function as a tool for the organization's continuous learning. If an electronic (interactive?) knowledge map is created, the need may arise to utilize an existing software in designing the interface. This is needed to ensure the ease of information searching and the active utilization and updating of the system. The main expertise areas should also be included into Trafi's organizational telephone directory to each expert's profile. These publications of information would prove especially useful when new people start work at Trafi, as this would allow them to independently seek the expertise needed.

All the solutions must be sufficiently simple (easy to use) for them to be implemented in a large organization and to facilitate their becoming a part of Trafi employees' everyday life.

Preliminary schedule

January 2012:

- Defining desired state an the Transport Technology department (Department Director and Heads of Unit)
- Planning the expertise audit
- Execution of the audit (interviews) in the Transport Technology department.

February 2012:

- Continuing the audit if needed
- Creating a knowledge map
- Defining the gaps in expertise
- Tracking down the missing expertise from teh organization.

March 2012:

- Defining, and if needed, creating the applicable methods of expertise transfer.

Use of work hours and resources

The data collection parts (interviews, other discussions, library visits, result reviews etc.) of the project are conducted during office hours. Otherwise the study is conducted on the author's own time, possibly by utilizing a study leave (applied for separately)

The study utilizes the following resources of Trafi, among others:

- HR department (personnel lists etc.)
- Results of expertise discussions (if possible)
- Experts and supervisors (interviews and discussions)
- Databases and intranet (material related to organizational changes)
- Strategy and Development department (transfer of expertise vs. Trafi strategy)

Knowledge utilization audit form

The expertise audit is conducted as a part of the Master's Thesis project of Special Adviser Ville Räisänen (Impacts and Products unit). The aim of the expertise audit is to function as a justification for development actions in Trafi's expertise management and the aim can be divided roughly into following parts:

- Mapping the special expertise areas of experts at the Transport Technology department, creating anonymous models of "expertise profiles"
- Determining the magnitude of the department's know-how and how well the expertise is utilized in the new organization Many experts without doubt have a lot of expertise which has been put aside with the organizational change and also expertise areas which need development due to new tasks.
- Based on the estimation of the magnitude of unutilized and missing expertise new practices are proposed for Trafi's expertise management.
- Mapping the experts' willingness to participate in various methods of expertise sharing and also assessing risks of loss of expertise.

I ask you to especially take note of the **expertise in need of development** and the **expertise you have which is unutilized**. In many segments the space limitations may reduce the length of the answers and in others many empty boxes will be left. I would like to interview all the experts in the department and go through the form so I would request approximately 20-40 minutes of your time for a small discussion. You may review the form in advance and also fill it if you have time but other preparations are not necessary. I will contact everyone in person to book the time. **Thank you in advance for your valuable help with the project!**

Background information:

Title:	
Department/Unit:	
Age:	
Years of experience at Trafi (+predecessor agencies):	

A: Organizational Change 2012 and Expertise:

	Arvio 1-5
1. Did your task demands change to less or more demanding in the organizational change? (1= significantly less demanding, 3=no change, 5= significantly more demanding:	
2. Is your field of duties narrower or wider than it was prior to teh organizational change? (1=significantly narrower, 3=no change, 5=significantly wider):	
3. Is the utilization of your expertise more or less efficient than it was prior to the organizational change? (1= significantly less efficient, 3=no change, 5= significantly more efficient):	

B: Expertise areas and their utilization at Trafi:

4. List here your most significant **technical expertise** and evaluate your expertise level on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this expertise in your current position (1=not at all, 5= very well).

Expertise:	Expertise level	Utilization

E.g. Boat technology, vessel technology, vehicle technology etc.

5. List here your most significant **legislative expertise (int'l & nat'l)** and evaluate your expertise level on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this expertise in your current position (1=not at all, 5= very well).

Expertise:	Expertise level	Utilization

E.g. Water Traffic Act and Decree, Aviation Act, Compatibility Directive etc.

6. List here your most significant **process expertise (internal, external, int'l and nat'l)** and evaluate your expertise level on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this expertise in your current position (1=not at all, 5= very well).

Expertise:	Expertise level	Utilization

E.g. EU and national legislative process, market surveillance process etc.

7. List here your most significant **language skills** and evaluate your expertise level on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this expertise in your current position (1=not at all, 5= very well).

Expertise:	Expertise level	Utilization

E.g. English, German, Flemish, French, Swedish, Retoroman

8. List here your most significant **advocacy expertise** and evaluate your expertise level on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this expertise in your current position (1=not at all, 5= very well).

Expertise:	Expertise level	Utilization
Media skills (interview experience, trainings etc.)		
Negotiation experience in national forums		
Negotiation experience in international forums		

E.g. Organizing, leading international events, public appearances, presentations, etc.

9. List here your most significant **Finnish authority and interest group contacts** and evaluate your level of familiarity on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this contact in your current position (1=not at all, 5= very well).

Finnish contact:	Familiarity	Utilization

E.g. Customs authority, Tukes, (can be ”combined” -> surveillance authorities)

10. List here your most significant **international authority and interest group contacts** and evaluate your level of familiarity on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this contact in your current position (1=not at all, 5= very well).

International contact:	Familiarity	Utilization

E.g. European Commission, EU co-operation authorities, Int'l associations, etc.

11. List here your **other most significant expertise** and evaluate your expertise level on a 1-5 scale (1=no experience, 5=expert) After this, evaluate in the next column, how well you can utilize this expertise in your current position (1=not at all, 5= very well).

Expertise:	Expertise level	Utilization

E.g. photography, IT skills, anything not fitting to previous categories…

Continued on the next page!

C: Sharing Expertise:

12. Estimate the usefulness of the **following methods of sharing expertise** to the organization on a 1-5 scale (1=not useful, 5=very useful). After that, estimate to the following column the usefulness of the method for the purposes of sharing and developing your own expertise (1=not useful, 5= very useful).

Method of sharing expertise:	Use for Trafi	Use for self
Wiki solution: An open expertise and information database, discussion forum, blogs and sharing information		
Substitute orientation: A substitute assigned to all tasks, who participates in the primary expert's duties (appointments, presentations, meetings)		
Mentoring in-house: Regular appointments, best practices, also between different departments and sectors		
Expertise discussions: More detailed development and monitoring of the expertise profiles, the development of primary expert and substitute.		

Other practices, ideas? Present in "free word" in the end.Muita käytäntöjä, ideoita? Ehdotuksia lopun "vapaaseen sanaan".

13. If there are scarcities in your expertise areas where you would need in-house expertise, is it easy to locate? (Example from previous – where "expertise" value is lower than "utilization")

14. Do you know a competent substitute to all of your duties?

15. Would the most competent substitute to your knowledge be located at:

same unit / different unit, same department / different department / different sector

16. Would you be willing to orientate a substitute for your tasks?

17. Would you be willing to familiarize yourself with someone else's tasks as a part of the substitute system?

18. Is actual relevant information in the organization readily available?

19. Is passing information to all possibly interested parties easy?

20-21. Questions 20-21: If Trafi introduced a wiki solution where the personnel expertise areas were clearly visible and which would provide a possibility to easily share information, best practices and opinions:

20. Do you see that you would use it? Would you use it mostly for looking for information or would you also be willing to actively share information?

21. What upsides and what problems would you see in the wiki solution?

22. Free word: Comments, new ideas, development ideas, critique, etc.:

Voluntary extra question:

To your estimate, do you see yourself working at Trafi for:

a) 0-2 years,
b) 2-5 years,
c) 5-10 years,
d) 10-20 years or
e) longer?

An example of the type task descriptions at Trafi

Trafi

PALKKAVAAKA

Task Description Form

Function / Unit / Department:

Task title: Yksikönpäällikkö

(Person's name:)

Supervisor (name and title): Department Director

Created: XX.XX.2011

Updated: KVAA

1. Task purpose and content

1.1 Task purpose and content
Head of Unit controls and supervises the functioning of the unit and his subordinates and is responsible for reaching the result goals set.

1.2 Key duty parts and duty areas
The task of the Head of Unit is to lead and develop the unit's activities and to be responsible for the unit's administrative issues. In addition, the tasks include the appropriate, as equal as possible division of tasks to subordinates as well as the support of the development of their competence. The Head of Unit decides the administrative orders in his jurisdiction according to the valid work order and judgment powers transfer document. The Head of Unit is responsible for drafting the financial estimates of his area of responsibility, adjustments of it and following the actualization of the budget. The Head of Unit is responsible for the preparation and follow-up on the development of national and international norms falling under the unit's jurisdiction as well as preparation of statements related to those. The Head of Unit participates if possible/necessary to his sector's expert tasks.

2. Expertise needed for the task

2.1 Central expertise areas for the task (needed knowledge and skills and their depth and width)
The task requires a wide knowledge of the unit's field of functioning and work environment as well as good knowledge of the related legislation. The task requires good supervisor, co-operation, negotiation and presentation skills as well as very good knowledge of both written and oral Finnish, Swedish and English languages.

3. Interaction environment related to task

3.1 The nature and goal of interaction (internal and external) related to the task
External interaction is negotiation and advocacy in national and international forums as well as consultation and information exchange with national and international customers, authorities and interest groups. Internal interaction consists of leading the unit's functioning and personnel as well as expert dialogue.

4. Direction and decision making processes of the task

4.1 Direction and framework of the task
The work is guided by result goals and instructions from the MINTC, Trafi strategy and values, Trafi executive group work, work order and instructions. In addition the functioning is guided by the sector's national and international regulation and their functioning environments.

4.2 The task's characteristic decision situations and the data acquisition and handling processes related.
Decision making is based on interpretation of regulation in different situations; some cases requiring new solutions and practices. In order to develop new practices, various background information must be acquired from national and international contacts (e.g. authorities, interest groups etc.); in some cases the information needs to be produced in-house. The Head of Unit must follow his subordinates' working and division of workload as well as divide the tasks appropriately and as equally as possible.

5. Task role and responsibility

5.1 The role of the task as a part of the function / process it is immediately attached to. Impact and responsibility related to the end results of the function /process.
The task has a strongly directive role and a clear responsibility of the functioning of the unit. The issues prepared, presented and dissolved may have significant economical and functional impacts on national businesses and citizens.